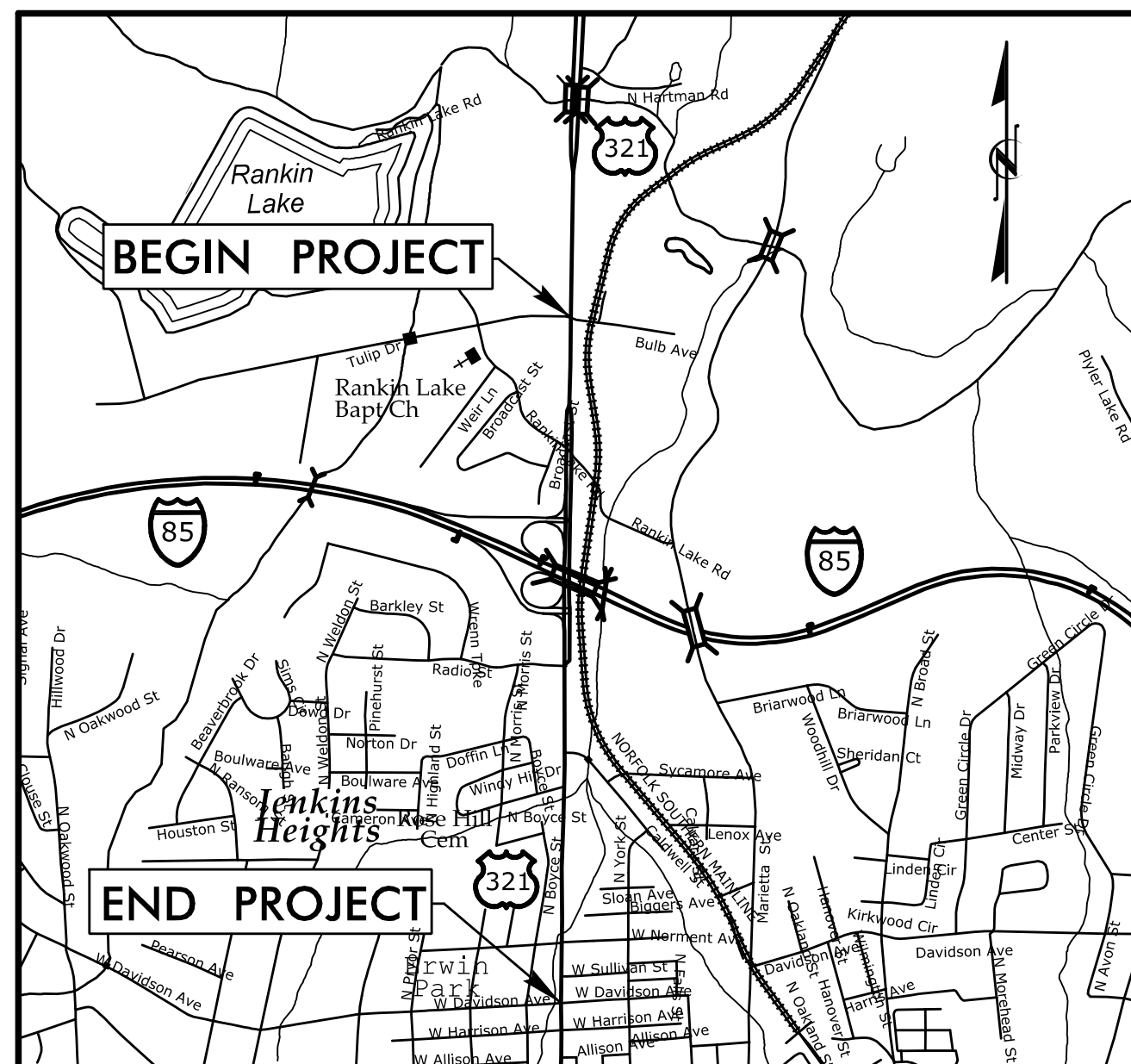


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Project: I-5000

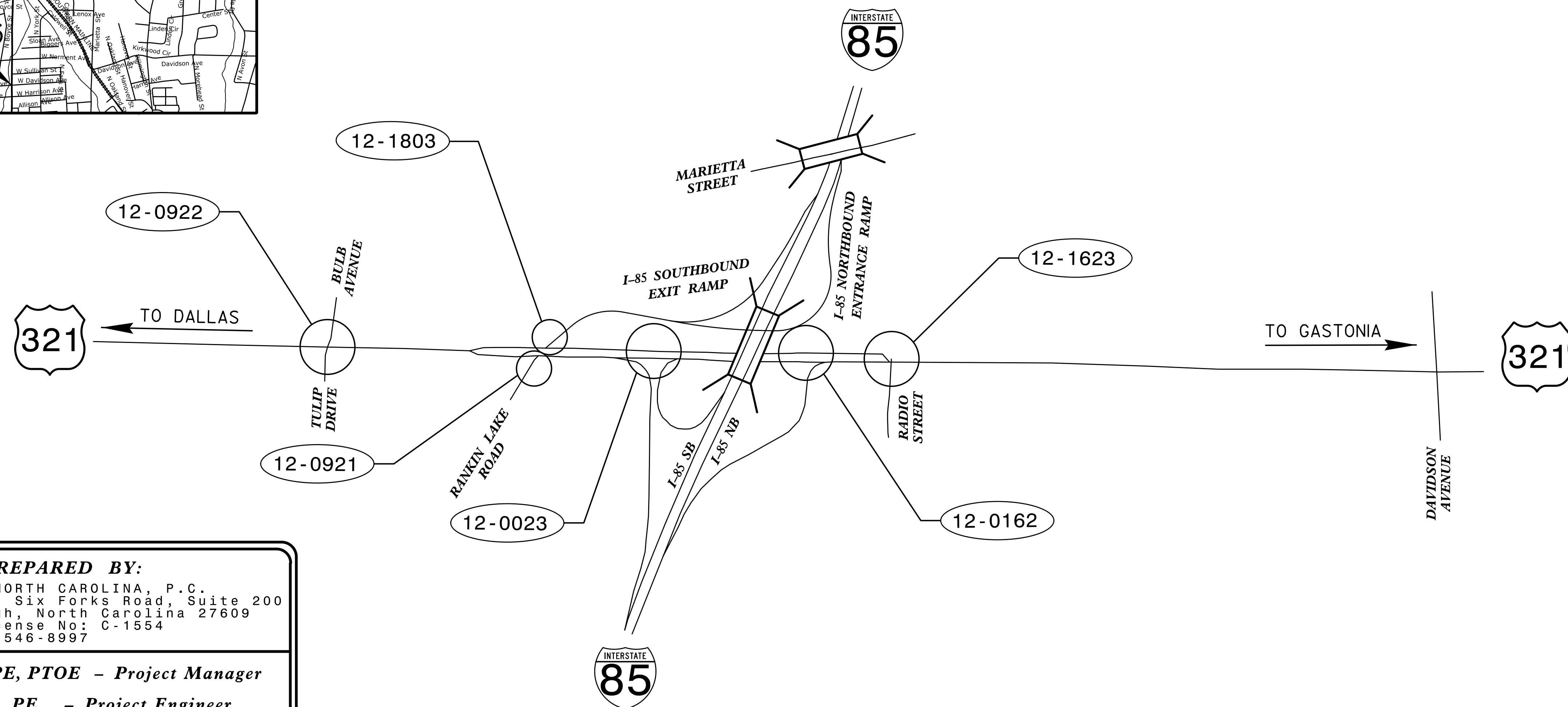


STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

GASTON COUNTY

LOCATION: US-321 FROM BULB AVE / TULIP DR TO
W DAVIDSON AVE

TYPE OF WORK: TRAFFIC SIGNALS AND FIBER OPTIC
COMMUNICATION CABLE ROUTING



PLANS PREPARED BY:

HNTB HNTB NORTH CAROLINA, P.C.
343 E. Six Forks Road, Suite 200
Raleigh, North Carolina 27609
NC License No: C-1554
(919) 546-8997

- Natasha R. Simmons, PE, PTOE - Project Manager
- Harvey L. Winstead, PE - Project Engineer
- Andrew D. Klinksiek, PE, PTOE - Project Engineer
- John A. Wagner, EI - Design Engineer
- Tracey R. Terrell - Design Technician

Contract: C203846

| Sheet # | Reference # | Location/Description |
|----------------|-------------|--|
| Sig. 1.0 | ----- | Title Sheet |
| Sig. 2.0-6.3 | 12-0922 | US 321 (Chester St) at Bulb Avenue / Tulip Drive |
| Sig. 7-7.2 | 12-1803 | US 321 (Chester St) at I-85 SB Exit Ramp / I-85 NB Entrance Ramp |
| Sig. 8.0-10.2 | 12-0921 | US 321 (Chester St) at Rankin Lake Road |
| Sig. 11.0-16.3 | 12-0023 | US 321 (Chester St) at I-85 Southbound Ramp |
| Sig. 17.0-21.3 | 12-0162 | US 321 (Chester St) at I-85 Northbound Ramp |
| Sig. 22.0-24.7 | 12-1623 | US 321 (Chester St) at Radio Street |
| Sig. M1-M8 | ----- | Standard Drawing for Metal Poles |
| Sig. P1-P3 | ----- | Pedestrian Pushbutton Location Details |
| SCP. 1-16 | ----- | Signal Communication Plans |

LEGEND

##-#### SIGNAL INVENTORY NUMBER

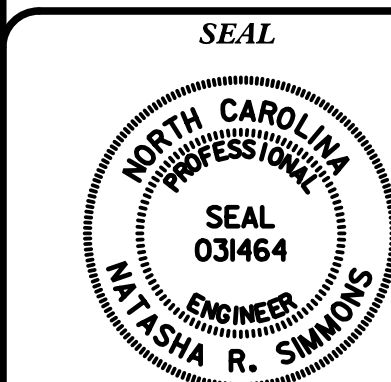
INTELLIGENT TRANSPORTATION AND SIGNALS UNIT

Contacts:

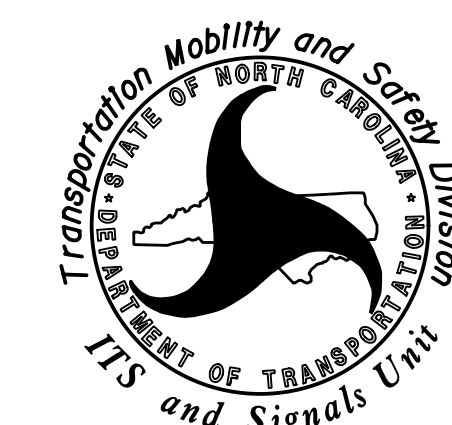
- Tim Williams, PE - Western Region Signals Engineer
- Todd Joyce, PE - Signal Equipment Design Engineer
- Neil Avery - Intelligent Transportation Systems Engineer

Refer to "Roadway Standard Drawings
NCDOT" dated January 2012 and
"Standard Specifications for Roads
and Structures" dated January 2012.

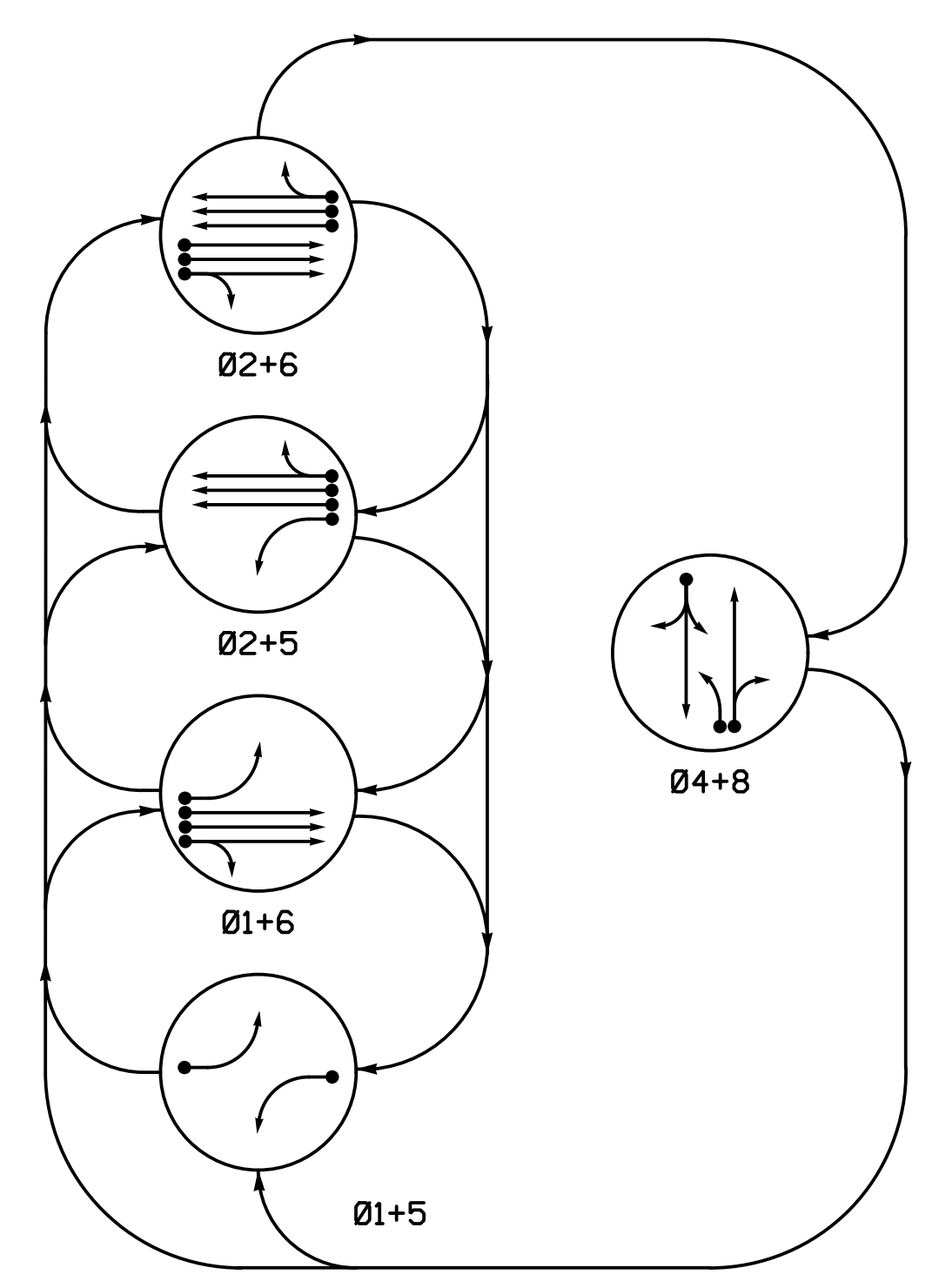
Prepared for the Office of:
DIVISION OF HIGHWAYS
TRANSPORTATION MOBILITY AND SAFETY
DIVISION



DocuSigned by:
Natasha R. Simmons 12/5/2016
SIGNATURE DATE



PHASING DIAGRAM



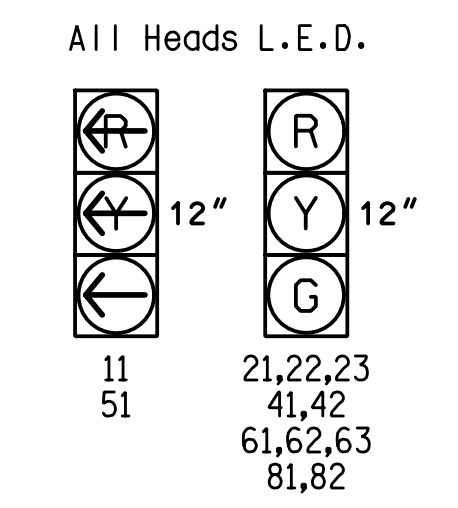
PHASING DIAGRAM DETECTION LEGEND

- ←● DETECTED MOVEMENT
- ← UNDETECTED MOVEMENT (OVERLAP)
- ← UN SIGNALIZED MOVEMENT
- ← PEDESTRIAN MOVEMENT

TABLE OF OPERATION

| SIGNAL FACE | PHASE | | | | | | | |
|-------------|-------|-------|-------|-------|-------|-------|-------|-------|
| | Ø 1+5 | Ø 1+6 | Ø 2+5 | Ø 2+6 | Ø 4+8 | Ø 1+5 | Ø 1+6 | Ø 2+5 |
| 11 | --- | --- | --- | --- | --- | --- | --- | --- |
| 21,22,23 | R | R | G | G | R | Y | | |
| 41,42 | R | R | R | R | G | R | | |
| 51 | --- | --- | --- | --- | --- | --- | --- | --- |
| 61,62,63 | R | G | R | G | R | Y | | |
| 81,82 | R | R | R | R | G | R | | |

SIGNAL FACE I.D.



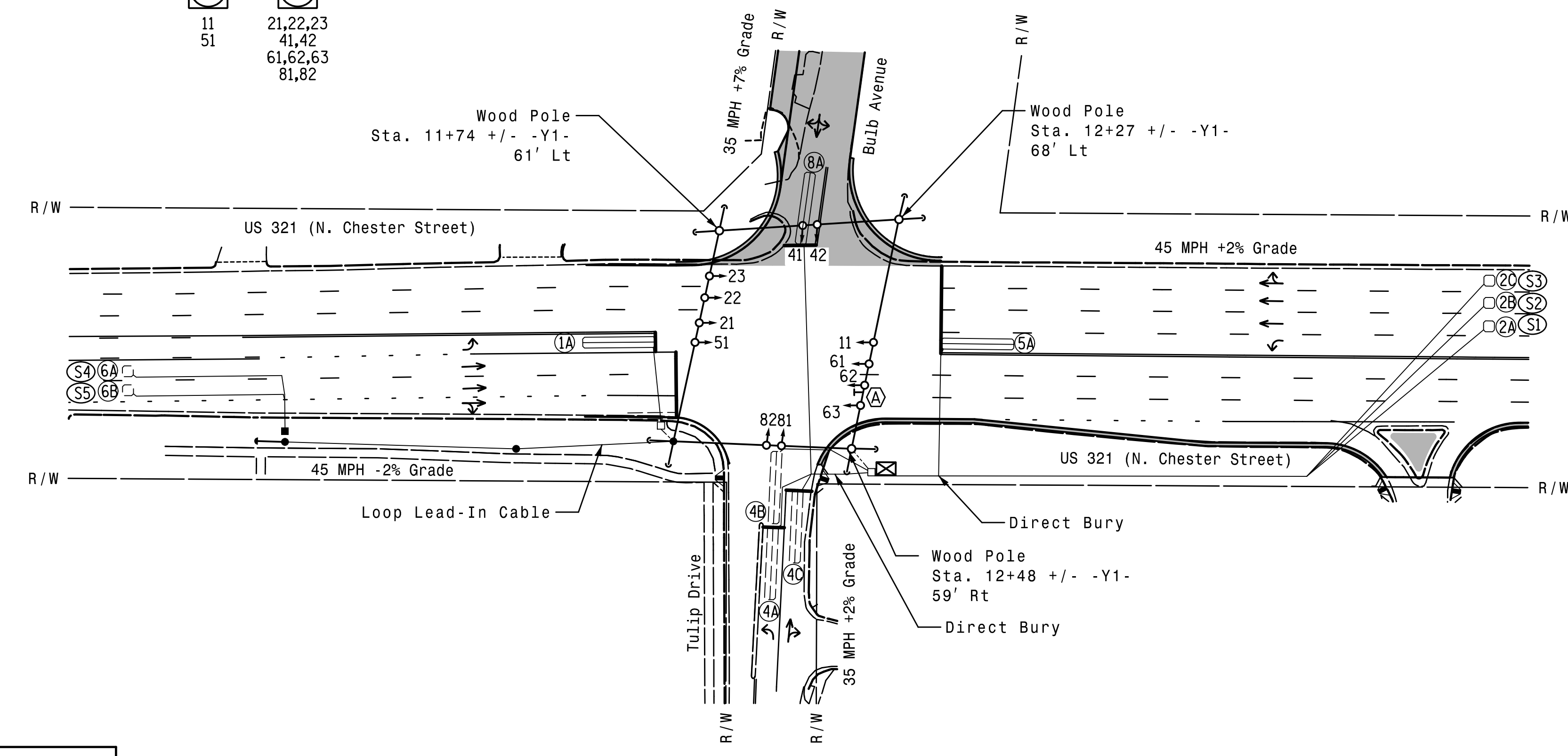
OASIS 2070 LOOP & DETECTOR INSTALLATION CHART

| LOOP | SIZE (FT) | DISTANCE FROM STOPBAR (FT) | TURNS | NEW LOOP | DETECTOR PROGRAMMING | | | | | SYSTEM LOOP | NEW CARD | |
|-------|-----------|----------------------------|-------|----------|----------------------|---------|-----------|-----------------|--------------|-------------|----------|------------|
| | | | | | PHASE | CALLING | EXTENSION | FULL TIME DELAY | STRETCH TIME | | | DELAY TIME |
| 1A | 6X40 | 0 | 2-4-2 | Y | 1 | Y | Y | - | - | 3 | - | Y |
| 2A/S1 | 6X6 | 300 | 5 | Y | 2 | Y | Y | - | - | - | - | Y |
| 2B/S2 | 6X6 | 300 | 5 | Y | 2 | Y | Y | - | - | - | - | Y |
| 2C/S3 | 6X6 | 300 | 5 | Y | 2 | Y | Y | - | - | - | - | Y |
| 4A | 6X40 | EXIST | 2-4-2 | - | 4 | Y | Y | - | - | - | - | Y |
| 4B | 6X40 | EXIST | 2-4-2 | - | 4 | Y | Y | - | - | 10 | - | Y |
| 4C | 6X40 | EXIST | 2-4-2 | - | 4 | Y | Y | - | - | 10 | - | Y |
| 5A | 6X40 | 0 | 2-4-2 | Y | 5 | Y | Y | - | - | 3 | - | Y |
| 6A/S4 | 6X6 | 300 | 5 | - | 6 | Y | Y | - | - | - | - | Y |
| 6B/S5 | 6X6 | 300 | 5 | - | 6 | Y | Y | - | - | - | - | Y |
| 8A | 6X40 | 0 | 2-4-2 | Y | 8 | Y | Y | - | - | 10 | - | Y |

5 Phase Fully Actuated (Gastonia City Signal System)

NOTES

- Refer to "Roadway Standard Drawings NCDOT" dated January 2012 and "Standard Specifications for Roads and Structures" dated January 2012.
- Do not program signal for late night flashing operation unless otherwise instructed by the Engineer.
- Phase 1 and/or phase 5 may be lagged.
- Set all detector units to presence mode.
- Locate new cabinet so as not to obstruct sight distance of vehicles turning right on red.
- Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.
- Signal System data: Controller Asset #0922.



OASIS 2070 TIMING CHART

| FEATURE | PHASE | | | | | |
|-------------------------|-------|------------|-----|-----|------------|-----|
| | 1 | 2 | 4 | 5 | 6 | 8 |
| Min Green 1 * | 7 | 12 | 7 | 7 | 12 | 7 |
| Extension 1 * | 2.0 | 6.0 | 2.0 | 2.0 | 6.0 | 2.0 |
| Max Green 1 * | 20 | 90 | 25 | 20 | 90 | 25 |
| Yellow Clearance | 3.0 | 4.3 | 3.7 | 3.0 | 4.7 | 3.5 |
| Red Clearance | 3.3 | 1.6 | 2.7 | 3.4 | 1.3 | 2.0 |
| Red Revert | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 |
| Walk 1 * | - | - | - | - | - | - |
| Don't Walk 1 | - | - | - | - | - | - |
| Seconds Per Actuation * | - | 1.5 | - | - | 1.5 | - |
| Max Variable Initial * | - | 34 | - | - | 34 | - |
| Time Before Reduction * | - | 15 | - | - | 15 | - |
| Time To Reduce * | - | 30 | - | - | 30 | - |
| Minimum Gap | - | 3.0 | - | - | 3.0 | - |
| Recall Mode | - | MIN RECALL | - | - | MIN RECALL | - |
| Vehicle Call Memory | - | YELLOW | - | - | YELLOW | - |
| Dual Entry | - | - | ON | - | - | ON |
| Simultaneous Gap | ON | ON | ON | ON | ON | ON |

* These values may be field adjusted. Do not adjust Min Green and Extension times for phases 2 and 6 lower than what is shown. Min Green for all other phases should not be lower than 4 seconds.

LEGEND

| | | | |
|--|---|--|---|
| | PROPOSED Traffic Signal Head | | EXISTING Traffic Signal Head |
| | PROPOSED Modified Signal Head | | EXISTING N/A |
| | PROPOSED Pedestrian Signal Head With Push Button & Sign | | EXISTING N/A |
| | PROPOSED Signal Pole with Guy | | EXISTING Signal Pole with Sidewalk Guy |
| | PROPOSED Inductive Loop Detector | | EXISTING Inductive Loop Detector |
| | PROPOSED Controller & Cabinet | | EXISTING Junction Box |
| | PROPOSED 2-in Underground Conduit | | EXISTING 2-in Underground Conduit |
| | PROPOSED Right of Way | | EXISTING Right of Way |
| | PROPOSED Directional Arrow | | EXISTING Directional Arrow |
| | PROPOSED Wheelchair Ramp | | EXISTING Wheelchair Ramp |
| | PROPOSED "DO NOT BLOCK INTERSECTION" SIGN (R10-7) | | EXISTING "DO NOT BLOCK INTERSECTION" SIGN (R10-7) |
| | PROPOSED Construction Zone | | EXISTING N/A |

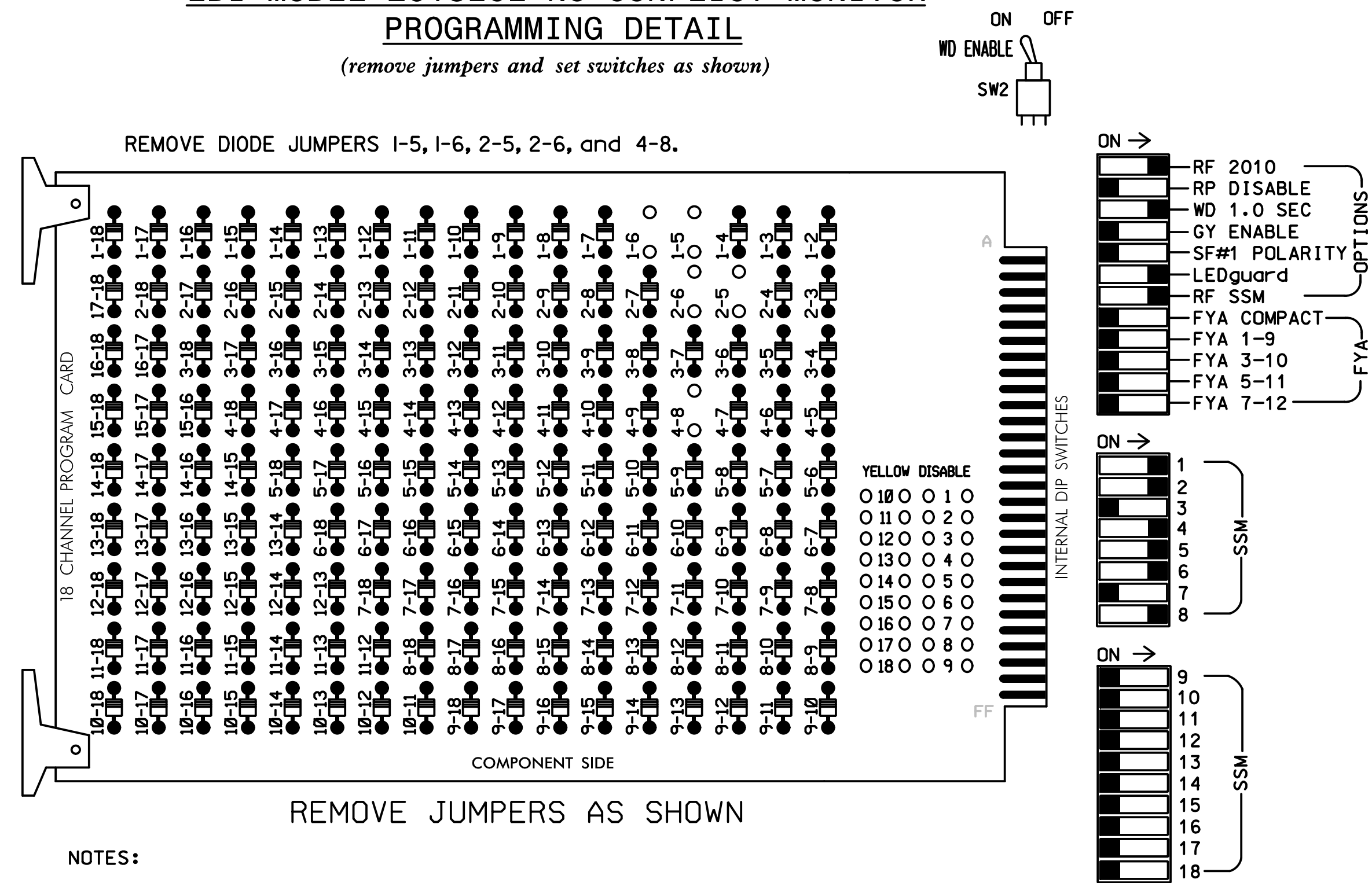
Temporary Signal Phase 1, Step 1

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

| | | | |
|---|---|---|------|
| | US 321 (N. Chester Street) at Bulb Avenue / Tulip Drive | | |
| | Division 12 Gaston Co. Gastonia | PLAN DATE: September 2016 REVIEWED BY: T.R. Terrell | |
| PREPARED BY: J.A. Wagner | REVIEWED BY: N.R. Simmons | 11/8/2016 | |
| REVISIONS | | INIT. | DATE |
| SCALE 1"=50' | | SIGNED: <i>Natasha R. Simmons</i> DATE: 11/8/2016 | |
| HNTB NORTH CAROLINA, P.C. 343 E. Six Forks Road, Suite 200 Raleigh, North Carolina 27609 NC License No: C-1554 (919) 546-8997 | | SIG. INVENTORY NO. 12-0922T1 | |

EDI MODEL 2018ECL-NC CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)



REMOVE JUMPERS AS SHOWN

NOTES:

1. Card is provided with all diode jumpers in place. Removal of any jumper allows its channels to run concurrently.
2. Ensure jumpers SEL2-SEL5 and SEL9 are present on the monitor board.
3. Ensure that Red Enable is active at all times during normal operation.
4. Connect serial cable from conflict monitor to comm. port 1 of 2070 controller. Ensure conflict monitor communicates with 2070.

NOTES

1. To prevent "flash-conflict" problems, insert red flash program blocks for all unused vehicle load switches in the output file. The installer shall verify that signal heads flash in accordance with the Signal Plans.
2. Program phases 4 and 8 for Dual Entry.
3. Enable Simultaneous Gap-Out for all phases.
4. Program phases 2 and 6 for Variable Initial and Gap Reduction.
5. Program phases 2 and 6 for Start Up In Green.
6. Program phases 2 and 6 for Yellow Flash.
7. The cabinet and controller are part of the Gastonia City System.

EQUIPMENT INFORMATION

CONTROLLER.....2070
 CABINET.....332
 SOFTWARE.....ECONOLITE OASIS
 CABINET MOUNT.....BASE
 OUTPUT FILE POSITIONS...12
 LOAD SWITCHES USED.....S1,S2,S5,S7,S8,S11
 PHASES USED.....1,2,4,5,6,8
 OVERLAPS.....NONE

SIGNAL HEAD HOOK-UP CHART

| LOAD SWITCH NO. | S1 | S2 | S3 | S4 | S5 | S6 | S7 | S8 | S9 | S10 | S11 | S12 |
|-----------------|-----|----------|-------|----|-------|-------|----|----------|-------|-----|-------|-------|
| CMU CHANNEL NO. | 1 | 2 | 13 | 3 | 4 | 14 | 5 | 6 | 15 | 7 | 8 | 16 |
| PHASE | 1 | 2 | 2 PED | 3 | 4 | 4 PED | 5 | 6 | 6 PED | 7 | 8 | 8 PED |
| SIGNAL HEAD NO. | 11 | 21,22,23 | NU | NU | 41,42 | NU | 51 | 61,62,63 | NU | NU | 81,82 | NU |
| RED | | 128 | | | 101 | | | 134 | | | 107 | |
| YELLOW | | 129 | | | 102 | | | 135 | | | 108 | |
| GREEN | | 130 | | | 103 | | | 136 | | | 109 | |
| RED ARROW | 125 | | | | | | | 131 | | | | |
| YELLOW ARROW | 126 | | | | | | | 132 | | | | |
| GREEN ARROW | 127 | | | | | | | 133 | | | | |
| Hand icon | | | | | | | | | | | | |
| Person icon | | | | | | | | | | | | |

NU = Not Used

INPUT FILE POSITION LAYOUT

(front view)

| FILE "I" | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 |
|----------|----------|---------|----------|-----|-----|----------|----------|-----|-----|------|------|------|------|-------------|
| U | ∅ 1 | ∅ 2/SYS | ∅ 2/SYS | ∅ 3 | ∅ 3 | ∅ 4 | ∅ 4 | ∅ 5 | ∅ 5 | ∅ 6 | ∅ 6 | ∅ 7 | ∅ 7 | FS |
| L | 1A | 2A/S1 | 2C/S3 | ∅ 3 | ∅ 3 | 4A | 4C | ∅ 5 | ∅ 5 | ∅ 6 | ∅ 6 | ∅ 7 | ∅ 7 | DC ISOLATOR |
| U | NOT USED | ∅ 2/SYS | NOT USED | ∅ 3 | ∅ 3 | ∅ 4 | NOT USED | ∅ 5 | ∅ 5 | ∅ 6 | ∅ 6 | ∅ 7 | ∅ 7 | ST |
| L | ∅ 5 | ∅ 6/SYS | ∅ 6/SYS | ∅ 7 | ∅ 7 | ∅ 8 | ∅ 8 | ∅ 9 | ∅ 9 | ∅ 10 | ∅ 10 | ∅ 11 | ∅ 11 | DC ISOLATOR |
| U | 5A | 6A/S4 | ∅ 6/SYS | ∅ 7 | ∅ 7 | 8A | ∅ 8 | ∅ 9 | ∅ 9 | ∅ 10 | ∅ 10 | ∅ 11 | ∅ 11 | ∅ 12 |
| L | NOT USED | ∅ 6/SYS | ∅ 6/SYS | ∅ 7 | ∅ 7 | NOT USED | ∅ 8 | ∅ 9 | ∅ 9 | ∅ 10 | ∅ 10 | ∅ 11 | ∅ 11 | ∅ 13 |
| | | 6B/S5 | ∅ 6/SYS | ∅ 7 | ∅ 7 | ∅ 8 | ∅ 8 | ∅ 9 | ∅ 9 | ∅ 10 | ∅ 10 | ∅ 11 | ∅ 11 | ∅ 14 |

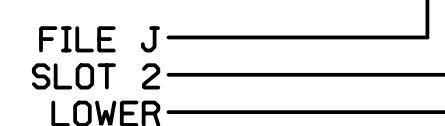
EX. : 1A, 2A, ETC. = LOOP NO.'S

FS = FLASH SENSE
 ST = STOP TIME

INPUT FILE CONNECTION & PROGRAMMING CHART

| LOOP NO. | LOOP TERMINAL | INPUT FILE POS. | PIN NO. | INPUT ASSIGNMENT NO. | DETECTOR NO. | NEMA PHASE | CALL | EXTEND | FULL TIME DELAY | STRETCH TIME | DELAY TIME |
|----------|---------------|-----------------|---------|----------------------|--------------|------------|------|--------|-----------------|--------------|------------|
| 1A | TB2-1,2 | I1U | 56 | 18 | 1 | 1 | Y | Y | | | 3 |
| 2A/S1 | TB2-5,6 | I2U | 39 | 1 | 2 | 2/SYS | Y | Y | | | |
| 2B/S2 | TB2-7,8 | I2L | 43 | 5 | 12 | 2/SYS | Y | Y | | | |
| 2C/S3 | TB2-9,10 | I3U | 63 | 25 | 32 | 2/SYS | Y | Y | | | |
| 4A | TB4-9,10 | I6U | 41 | 3 | 4 | 4 | Y | Y | | | |
| 4B | TB4-11,12 | I6L | 45 | 7 | 14 | 4 | Y | Y | | | 10 |
| 4C | TB6-1,2 | I7U | 65 | 27 | 34 | 4 | Y | Y | | | 10 |
| 5A | TB3-1,2 | J1U | 55 | 17 | 5 | 5 | Y | Y | | | 3 |
| 6A/S4 | TB3-5,6 | J2U | 40 | 2 | 6 | 6/SYS | Y | Y | | | |
| 6B/S5 | TB3-7,8 | J2L | 44 | 6 | 16 | 6/SYS | Y | Y | | | |
| 8A | TB5-9,10 | J6U | 42 | 4 | 8 | 8 | Y | Y | | | 10 |

INPUT FILE POSITION LEGEND: J2L

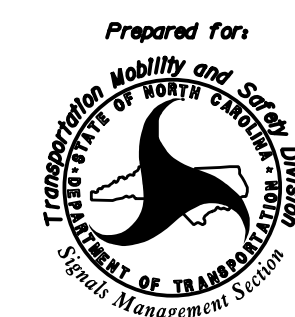


THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 12-0922T1
 DESIGNED: September 2016
 SEALED: 11-08-2016
 REVISED:

Temporary Signal
 Phase 1, Step 1

DOCUMENT NOT CONSIDERED FINAL
 UNLESS ALL SIGNATURES COMPLETED

ELECTRICAL AND PROGRAMMING
 DETAILS FOR:



US 321 (N. Chester Street)
 at
 Bulb Avenue / Tulip Drive

SEAL



Division 12 Gaston Co. Gastonia
 PLAN DATE: September 2016 REVIEWED BY: T.R. Terrell
 PREPARED BY: J.A. Wagner REVIEWED BY: N.R. Simmons

| REVISIONS | INIT. | DATE |
|-----------|-------|------|
| | | |
| | | |

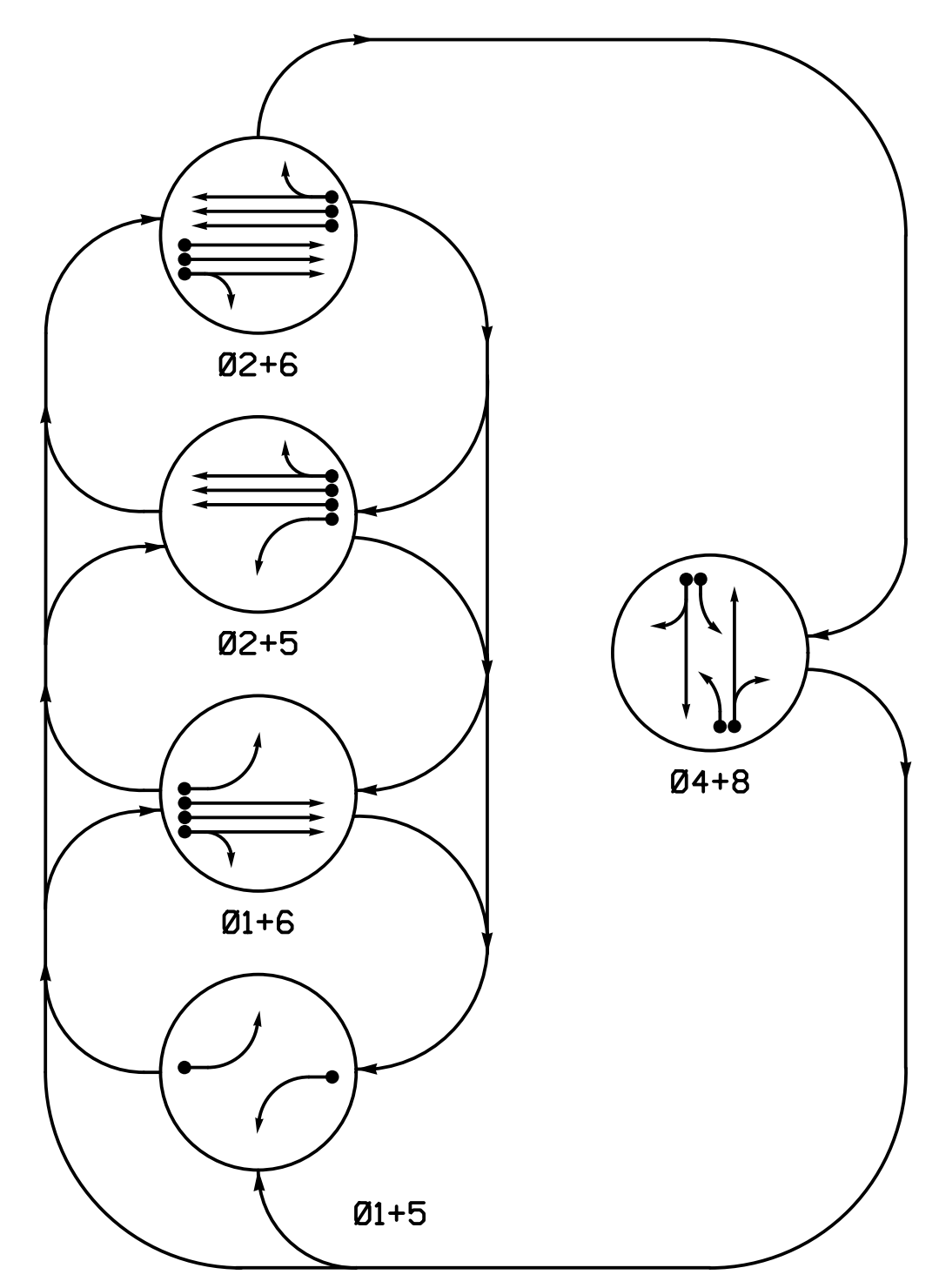
DocuSigned by:
 Natasha R. Simmons 11/8/2016
 SIGNATURE DATE

SIG. INVENTORY NO. 12-0922T1

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 343 E. Six Forks Road, Suite 200
 Raleigh, North Carolina 27609
 NC License No: C-1554
 (919) 546-8997

750 N. Greenfield Pkwy, Garner, NC 27529

PHASING DIAGRAM

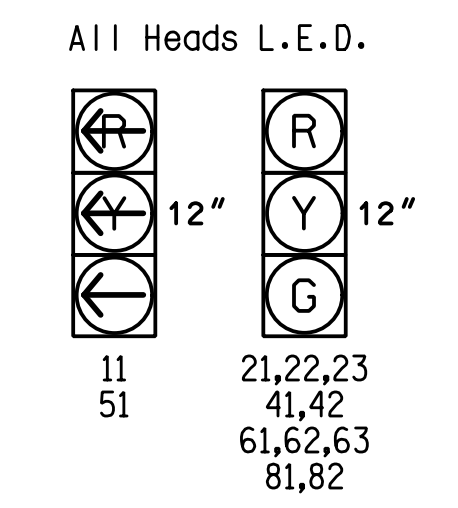


PHASING DIAGRAM DETECTION LEGEND

- ←● DETECTED MOVEMENT
- ← UNDETECTED MOVEMENT (OVERLAP)
- ←..... UNSIGNALIZED MOVEMENT
- ←- - - PEDESTRIAN MOVEMENT

| SIGNAL FACE | PHASE | | | | | | | |
|-------------|-------|-------|-------|-------|-------|-------|-------|-------|
| | Ø 1+5 | Ø 1+6 | Ø 2+5 | Ø 2+6 | Ø 4+8 | Ø 5+6 | Ø 5+7 | Ø 5+8 |
| 11 | --- | --- | --- | --- | --- | --- | --- | --- |
| 21,22,23 | R | R | G | G | R | Y | | |
| 41,42 | R | R | R | R | G | R | | |
| 51 | --- | --- | --- | --- | --- | --- | --- | --- |
| 61,62,63 | R | G | R | G | R | Y | | |
| 81,82 | R | R | R | R | G | R | | |

SIGNAL FACE I.D.

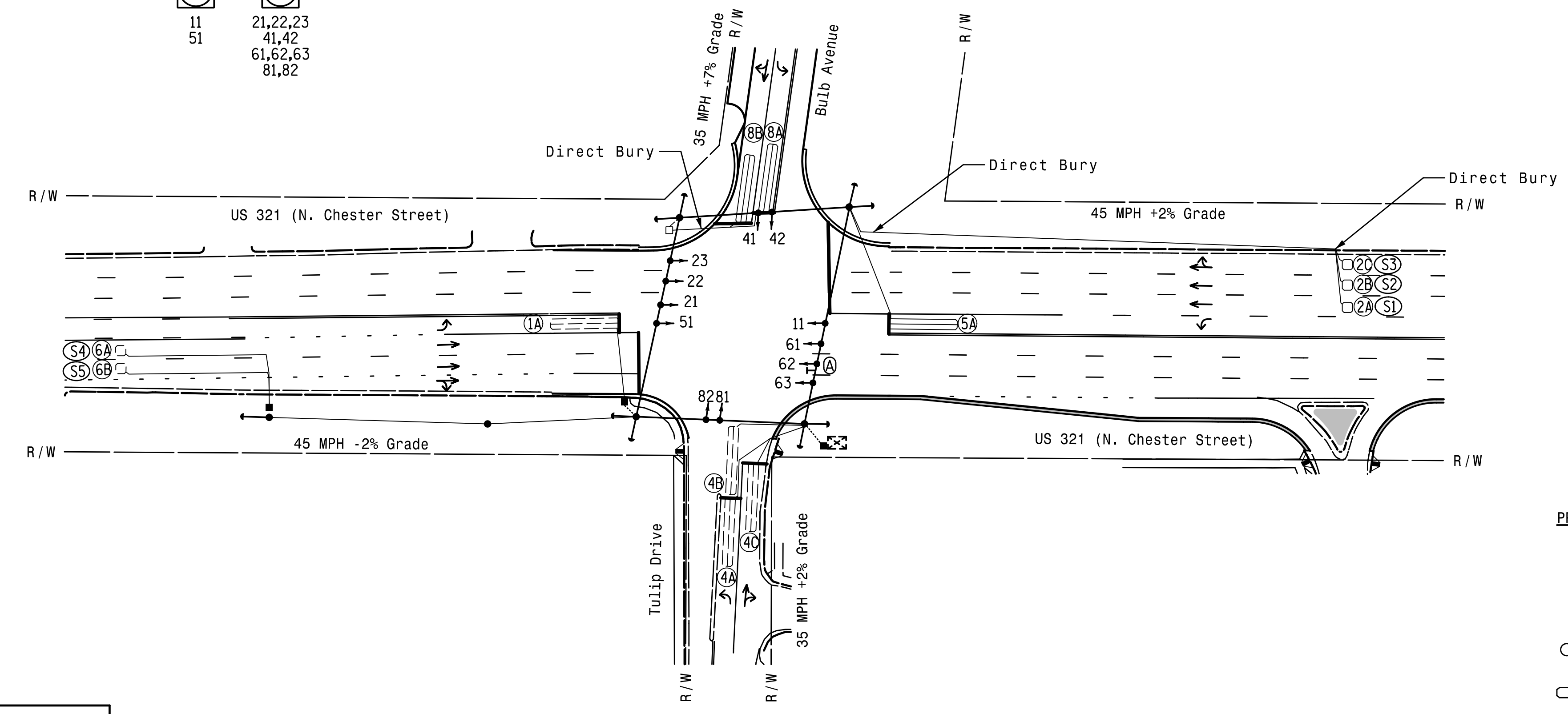


| OASIS 2070 LOOP & DETECTOR INSTALLATION CHART | | | | | | | | | | | | |
|---|-----------|----------------------------|-------|----------|----------------------|---------|-----------|-----------------|--------------|------------|-------------|----------|
| INDUCTIVE LOOPS | | | | | DETECTOR PROGRAMMING | | | | | | | |
| LOOP | SIZE (FT) | DISTANCE FROM STOPBAR (FT) | TURNS | NEW LOOP | PHASE | CALLING | EXTENSION | FULL TIME DELAY | STRETCH TIME | DELAY TIME | SYSTEM LOOP | NEW CARD |
| 1A | 6X40 | 0 | 2-4-2 | - | 1 | Y | Y | - | - | 3 | - | - |
| 2A/S1 | 6X6 | 300 | 5 | Y | 2 | Y | Y | - | - | - | Y | - |
| 2B/S2 | 6X6 | 300 | 5 | Y | 2 | Y | Y | - | - | - | Y | - |
| 2C/S3 | 6X6 | 300 | 5 | Y | 2 | Y | Y | - | - | - | Y | - |
| 4A | 6X40 | EXIST | 2-4-2 | - | 4 | Y | Y | - | - | - | - | - |
| 4B | 6X40 | EXIST | 2-4-2 | - | 4 | Y | Y | - | - | 10 | - | - |
| 4C | 6X40 | EXIST | 2-4-2 | - | 4 | Y | Y | - | - | 10 | - | - |
| 5A | 6X40 | 0 | 2-4-2 | Y | 5 | Y | Y | - | - | 3 | - | - |
| 6A/S4 | 6X6 | 300 | 5 | - | 6 | Y | Y | - | - | - | Y | - |
| 6B/S5 | 6X6 | 300 | 5 | - | 6 | Y | Y | - | - | - | Y | - |
| 8A | 6X40 | 0 | 2-4-2 | Y | 8 | Y | Y | - | - | 3 | - | - |
| 8B | 6X40 | 0 | 2-4-2 | Y | 8 | Y | Y | - | - | 10 | - | Y |

5 Phase Fully Actuated (Gastonia City Signal System)

NOTES

- Refer to "Roadway Standard Drawings NCDOT" dated January 2012 and "Standard Specifications for Roads and Structures" dated January 2012.
- Do not program signal for late night flashing operation unless otherwise instructed by the Engineer.
- Phase 1 and/or phase 5 may be lagged.
- Reposition existing signal heads 81 and 82.
- Set all detector units to presence mode.
- Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.
- Signal System data: Controller Asset #0922.



| OASIS 2070 TIMING CHART | | | | | | |
|-------------------------|-------|------------|-----|-----|------------|-----|
| FEATURE | PHASE | | | | | |
| | 1 | 2 | 4 | 5 | 6 | 8 |
| Min Green 1 * | 7 | 12 | 7 | 7 | 12 | 7 |
| Extension 1 * | 2.0 | 6.0 | 2.0 | 2.0 | 6.0 | 2.0 |
| Max Green 1 * | 20 | 90 | 25 | 20 | 90 | 25 |
| Yellow Clearance | 3.0 | 4.3 | 3.7 | 3.0 | 4.7 | 3.5 |
| Red Clearance | 3.3 | 1.1 | 2.7 | 3.4 | 1.3 | 2.1 |
| Red Revert | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 |
| Walk 1 * | - | - | - | - | - | - |
| Don't Walk 1 | - | - | - | - | - | - |
| Seconds Per Actuation * | - | 1.5 | - | - | 1.5 | - |
| Max Variable Initial * | - | 34 | - | - | 34 | - |
| Time Before Reduction * | - | 15 | - | - | 15 | - |
| Time To Reduce * | - | 30 | - | - | 30 | - |
| Minimum Gap | - | 3.0 | - | - | 3.0 | - |
| Recall Mode | - | MIN RECALL | - | - | MIN RECALL | - |
| Vehicle Call Memory | - | YELLOW | - | - | YELLOW | - |
| Dual Entry | - | - | ON | - | - | ON |
| Simultaneous Gap | ON | ON | ON | ON | ON | ON |

* These values may be field adjusted. Do not adjust Min Green and Extension times for phases 2 and 6 lower than what is shown. Min Green for all other phases should not be lower than 4 seconds.

| PROPOSED | | EXISTING | |
|----------|--|----------|-----|
| ○→ | Traffic Signal Head | ●→ | N/A |
| ●→ | Modified Signal Head | + | N/A |
| ⊥ | Sign | ⊥ | N/A |
| ⊥ | Pedestrian Signal Head With Push Button & Sign | ⊥ | N/A |
| ○→ | Signal Pole with Guy | ●→ | N/A |
| ○→ | Signal Pole with Sidewalk Guy | ●→ | N/A |
| ⊥ | Inductive Loop Detector | ⊥ | N/A |
| ⊥ | Controller & Cabinet | ⊥ | N/A |
| ⊥ | Junction Box | ⊥ | N/A |
| ⊥ | 2-in Underground Conduit | ⊥ | N/A |
| N/A | Right of Way | --- | N/A |
| N/A | Directional Arrow | → | N/A |
| N/A | Wheelchair Ramp | ↗ | N/A |
| ⊥ | "DO NOT BLOCK INTERSECTION" Sign (R10-7) | ⊥ | N/A |
| ■ | Construction Zone | ■ | N/A |

Temporary Signal Phase 1, Step 3

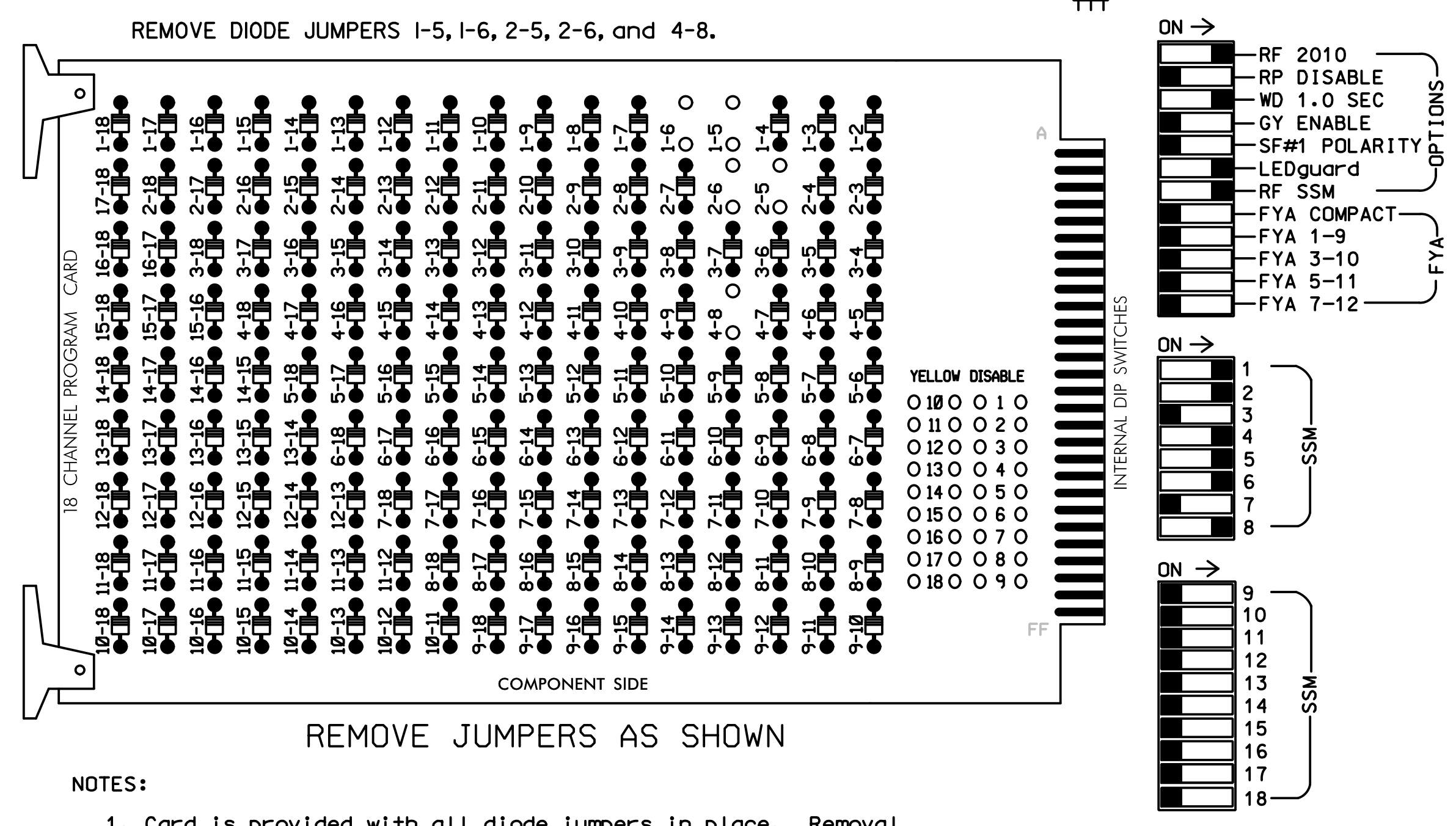
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

| | | | |
|-------------------|--|--|--------------|
| | US 321 (N. Chester Street) at Bulb Avenue / Tulip Drive | | |
| | Division 12 Gaston Co. Gastonia PLAN DATE: September 2016 PREPARED BY: J.A. Wagner | REVIEWED BY: T.R. Terrell REVIEWED BY: N.R. Simmons | |
| SCALE: 1"=50' | | REVISIONS: | INITI. DATE: |

HNTB HNTB NORTH CAROLINA, P.C.
 343 E. Six Forks Road, Suite 200
 Raleigh, North Carolina 27609
 NC License No: C-1554
 (919) 546-8997

EDI MODEL 2018ECL-NC CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)



NOTES:

1. Card is provided with all diode jumpers in place. Removal of any jumper allows its channels to run concurrently.
2. Ensure jumpers SEL2-SEL5 and SEL9 are present on the monitor board.
3. Ensure that Red Enable is active at all times during normal operation.
4. Connect serial cable from conflict monitor to comm. port 1 of 2070 controller. Ensure conflict monitor communicates with 2070.

NOTES

1. To prevent "flash-conflict" problems, insert red flash program blocks for all unused vehicle load switches in the output file. The installer shall verify that signal heads flash in accordance with the Signal Plans.
2. Program phases 4 and 8 for Dual Entry.
3. Enable Simultaneous Gap-Out for all phases.
4. Program phases 2 and 6 for Variable Initial and Gap Reduction.
5. Program phases 2 and 6 for Start Up In Green.
6. Program phases 2 and 6 for Yellow Flash.
7. The cabinet and controller are part of the Gastonia City System.

EQUIPMENT INFORMATION

CONTROLLER.....2070
 CABINET.....332
 SOFTWARE.....ECONOLITE OASIS
 CABINET MOUNT.....BASE
 OUTPUT FILE POSITIONS...12
 LOAD SWITCHES USED.....S1,S2,S5,S7,S8,S11
 PHASES USED.....1,2,4,5,6,8
 OVERLAPS.....NONE

SIGNAL HEAD HOOK-UP CHART

| LOAD SWITCH NO. | S1 | S2 | S3 | S4 | S5 | S6 | S7 | S8 | S9 | S10 | S11 | S12 |
|-----------------|-----|----------|-------|----|-------|-------|----|----------|-------|-----|-------|-------|
| CMU CHANNEL NO. | 1 | 2 | 13 | 3 | 4 | 14 | 5 | 6 | 15 | 7 | 8 | 16 |
| PHASE | 1 | 2 | 2 PED | 3 | 4 | 4 PED | 5 | 6 | 6 PED | 7 | 8 | 8 PED |
| SIGNAL HEAD NO. | 11 | 21,22,23 | NU | NU | 41,42 | NU | 51 | 61,62,63 | NU | NU | 81,82 | NU |
| RED | | 128 | | | 101 | | | 134 | | | 107 | |
| YELLOW | | 129 | | | 102 | | | 135 | | | 108 | |
| GREEN | | 130 | | | 103 | | | 136 | | | 109 | |
| RED ARROW | 125 | | | | | | | 131 | | | | |
| YELLOW ARROW | 126 | | | | | | | 132 | | | | |
| GREEN ARROW | 127 | | | | | | | 133 | | | | |
| Hand icon | | | | | | | | | | | | |
| Person icon | | | | | | | | | | | | |

NU = Not Used

INPUT FILE POSITION LAYOUT

| FILE | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 |
|------|----------|---------|----------|-----|----------|-----|------|-----|-----|-----|-----|-----|-----|-----|
| U | ∅ 1 | ∅ 2/SYS | ∅ 2/SYS | ∅ 4 | ∅ 4 | ∅ 4 | ∅ 4 | ∅ 8 | ∅ 8 | ∅ 8 | ∅ 8 | ∅ 8 | ∅ 8 | ∅ 8 |
| I | 1A | 2A/S1 | 2C/S3 | 4A | 4C | 4B | USED | 8A | 8B | 8C | 8D | 8E | 8F | 8G |
| L | NOT USED | ∅ 2/SYS | NOT USED | ∅ 4 | NOT USED | ∅ 4 | ∅ 4 | ∅ 8 | ∅ 8 | ∅ 8 | ∅ 8 | ∅ 8 | ∅ 8 | ∅ 8 |
| U | ∅ 5 | ∅ 6/SYS | ∅ 6/SYS | ∅ 8 | ∅ 8 | ∅ 8 | ∅ 8 | ∅ 8 | ∅ 8 | ∅ 8 | ∅ 8 | ∅ 8 | ∅ 8 | ∅ 8 |
| I | 5A | 6A/S4 | 6B/S5 | 8A | 8B | 8C | 8D | 8E | 8F | 8G | 8H | 8I | 8J | 8K |
| L | NOT USED | ∅ 6/SYS | ∅ 6/SYS | ∅ 8 | ∅ 8 | ∅ 8 | ∅ 8 | ∅ 8 | ∅ 8 | ∅ 8 | ∅ 8 | ∅ 8 | ∅ 8 | ∅ 8 |

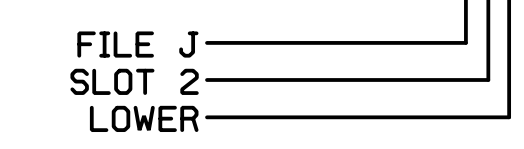
EX.: 1A, 2A, ETC. = LOOP NO.'S

FS = FLASH SENSE
 ST = STOP TIME

INPUT FILE CONNECTION & PROGRAMMING CHART

| LOOP NO. | LOOP TERMINAL | INPUT FILE POS. | PIN NO. | INPUT ASSIGNMENT NO. | DETECTOR NO. | NEMA PHASE | CALL | EXTEND | FULL TIME DELAY | STRETCH TIME | DELAY TIME |
|----------|---------------|-----------------|---------|----------------------|--------------|------------|------|--------|-----------------|--------------|------------|
| 1A | TB2-1,2 | I1U | 56 | 18 | 1 | 1 | Y | Y | | | 3 |
| 2A/S1 | TB2-5,6 | I2U | 39 | 1 | 2 | 2/SYS | Y | Y | | | |
| 2B/S2 | TB2-7,8 | I2L | 43 | 5 | 2 | 2/SYS | Y | Y | | | |
| 2C/S3 | TB2-9,10 | I3U | 63 | 25 | 32 | 2/SYS | Y | Y | | | |
| 4A | TB4-9,10 | I6U | 41 | 3 | 4 | 4 | Y | Y | | | |
| 4B | TB4-11,12 | I6L | 45 | 7 | 14 | 4 | Y | Y | | | 10 |
| 4C | TB6-1,2 | I7U | 65 | 27 | 34 | 4 | Y | Y | | | 10 |
| 5A | TB3-1,2 | J1U | 55 | 17 | 5 | 5 | Y | Y | | | 3 |
| 6A/S4 | TB3-5,6 | J2U | 40 | 2 | 6 | 6/SYS | Y | Y | | | |
| 6B/S5 | TB3-7,8 | J2L | 44 | 6 | 16 | 6/SYS | Y | Y | | | |
| 8A | TB5-9,10 | J6U | 42 | 4 | 8 | 8 | Y | Y | | | 3 |
| 8B | TB5-11,12 | J6L | 46 | 8 | 18 | 8 | Y | Y | | | 10 |

INPUT FILE POSITION LEGEND: J2L



THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 12-0922T2
 DESIGNED: September 2016
 SEALED: 11-08-2016
 REVISED:

Temporary Signal
 Phase 1, Step 3

**DOCUMENT NOT CONSIDERED FINAL
 UNLESS ALL SIGNATURES COMPLETED**

ELECTRICAL AND PROGRAMMING DETAILS FOR:

US 321 (N. Chester Street)
 at
 Bulb Avenue / Tulip Drive

Division 12 Gaston Co. Gastonia

PLAN DATE: September 2016 REVIEWED BY: T.R. Terrell

PREPARED BY: J.A. Wagner REVIEWED BY: N.R. Simmons

| REVISIONS | INIT. | DATE |
|-----------|-------|------|
| | | |

SEAL

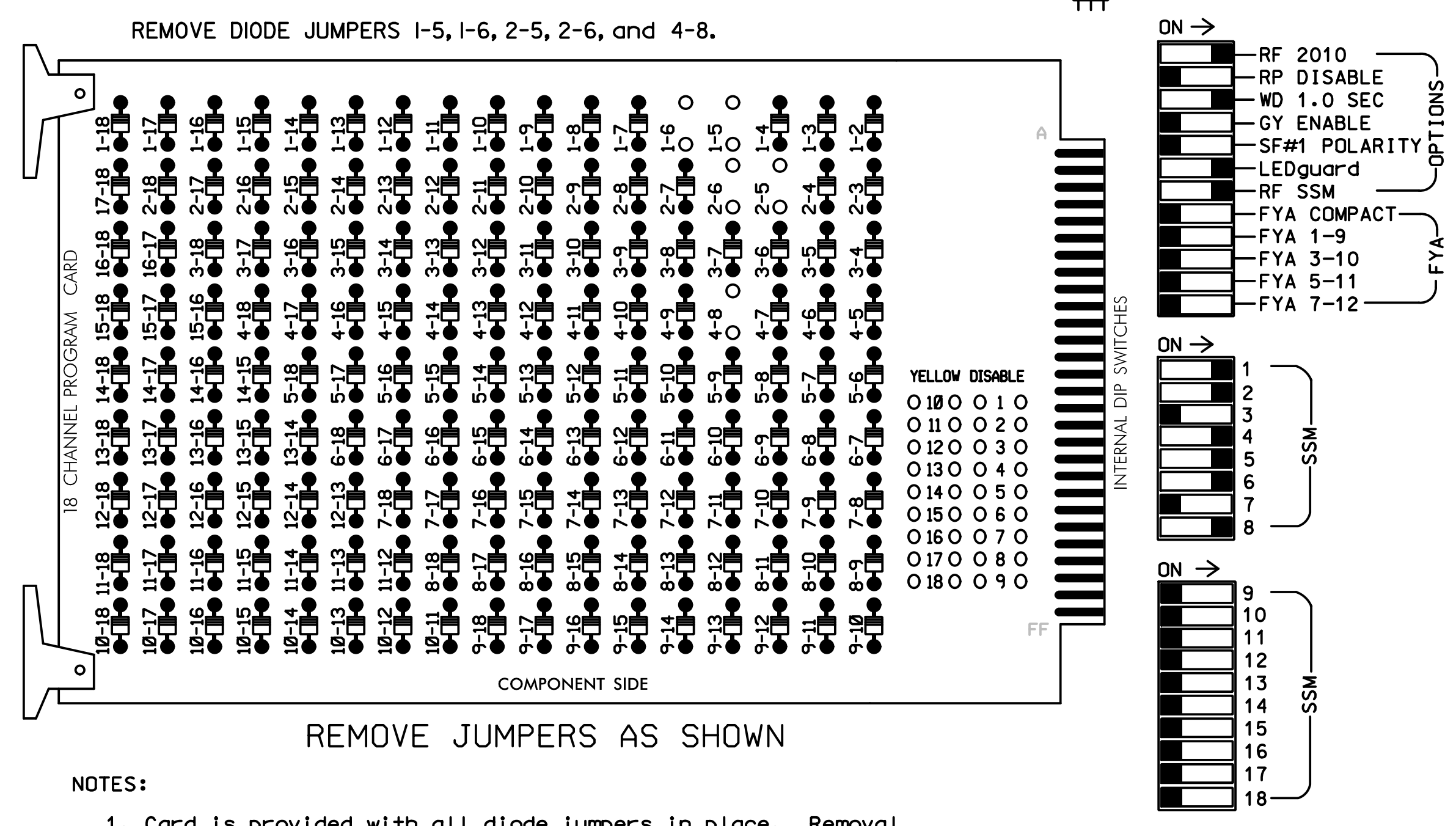
DocuSigned by:
 Natasha R. Simmons 11/8/2016

SIGNATURE DATE

SIG. INVENTORY NO. 12-0922T2

EDI MODEL 2018ECL-NC CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)



NOTES:

1. Card is provided with all diode jumpers in place. Removal of any jumper allows its channels to run concurrently.
2. Ensure jumpers SEL2-SEL5 and SEL9 are present on the monitor board.
3. Ensure that Red Enable is active at all times during normal operation.
4. Connect serial cable from conflict monitor to comm. port 1 of 2070 controller. Ensure conflict monitor communicates with 2070.

NOTES

1. To prevent "flash-conflict" problems, insert red flash program blocks for all unused vehicle load switches in the output file. The installer shall verify that signal heads flash in accordance with the Signal Plans.
2. Program phases 4 and 8 for Dual Entry.
3. Enable Simultaneous Gap-Out for all phases.
4. Program phases 2 and 6 for Variable Initial and Gap Reduction.
5. Program phases 2 and 6 for Start Up In Green.
6. Program phases 2 and 6 for Yellow Flash.
7. The cabinet and controller are part of the Gastonia City System.

EQUIPMENT INFORMATION

CONTROLLER.....2070
 CABINET.....332
 SOFTWARE.....ECONOLITE OASIS
 CABINET MOUNT.....BASE
 OUTPUT FILE POSITIONS...12
 LOAD SWITCHES USED.....S1,S2,S5,S7,S8,S11
 PHASES USED.....1,2,4,5,6,8
 OVERLAPS.....NONE

SIGNAL HEAD HOOK-UP CHART

| LOAD SWITCH NO. | S1 | S2 | S3 | S4 | S5 | S6 | S7 | S8 | S9 | S10 | S11 | S12 |
|-----------------|-----|-------|-------|----|-------|-------|----|----------|-------|-----|-------|-------|
| CMU CHANNEL NO. | 1 | 2 | 13 | 3 | 4 | 14 | 5 | 6 | 15 | 7 | 8 | 16 |
| PHASE | 1 | 2 | 2 PED | 3 | 4 | 4 PED | 5 | 6 | 6 PED | 7 | 8 | 8 PED |
| SIGNAL HEAD NO. | 11 | 21,22 | NU | NU | 41,42 | NU | 51 | 61,62,63 | NU | NU | 81,82 | NU |
| RED | | 128 | | | 101 | | | 134 | | | 107 | |
| YELLOW | | 129 | | | 102 | | | 135 | | | 108 | |
| GREEN | | 130 | | | 103 | | | 136 | | | 109 | |
| RED ARROW | 125 | | | | | | | 131 | | | | |
| YELLOW ARROW | 126 | | | | | | | 132 | | | | |
| GREEN ARROW | 127 | | | | | | | 133 | | | | |
| | | | | | | | | | | | | |
| | | | | | | | | | | | | |

NU = Not Used

INPUT FILE POSITION LAYOUT

| FILE | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 |
|------|----------|---------|-----|-----|----------|-----|-----|-----|-----|-----|-----|-----|-----|-------------|
| U | ∅ 1 | ∅ 2/SYS | ∅ 3 | ∅ 4 | ∅ 4 | ∅ 4 | ∅ 4 | ∅ 4 | ∅ 4 | ∅ 4 | ∅ 4 | ∅ 4 | ∅ 4 | FS |
| I | 1A | 2A/S1 | | 4A | 4C | | | | | | | | | DC ISOLATOR |
| L | NOT USED | ∅ 2/SYS | | ∅ 4 | NOT USED | | | | | | | | | ST |
| U | ∅ 5 | ∅ 6/SYS | ∅ 7 | ∅ 8 | ∅ 8 | ∅ 8 | ∅ 8 | ∅ 8 | ∅ 8 | ∅ 8 | ∅ 8 | ∅ 8 | ∅ 8 | DC ISOLATOR |
| J | 5A | 6A/S4 | | 8A | | | | | | | | | | |
| L | NOT USED | ∅ 6/SYS | | ∅ 8 | | | | | | | | | | |
| | | 6B/S5 | | 8B | | | | | | | | | | |

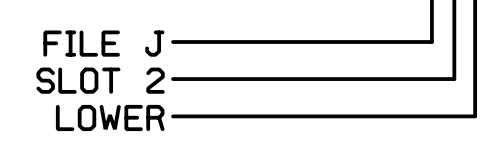
EX.: 1A, 2A, ETC. = LOOP NO.'S

FS = FLASH SENSE
 ST = STOP TIME

INPUT FILE CONNECTION & PROGRAMMING CHART

| LOOP NO. | LOOP TERMINAL | INPUT FILE POS. | PIN NO. | INPUT ASSIGNMENT NO. | DETECTOR NO. | NEMA PHASE | CALL | EXTEND | FULL TIME DELAY | STRETCH TIME | DELAY TIME |
|----------|---------------|-----------------|---------|----------------------|--------------|------------|------|--------|-----------------|--------------|------------|
| 1A | TB2-1,2 | I1U | 56 | 18 | 1 | 1 | Y | Y | | | 3 |
| 2A/S1 | TB2-5,6 | I2U | 39 | 1 | 2 | 2/SYS | Y | Y | | | |
| 2B/S2 | TB2-7,8 | I2L | 43 | 5 | 2 | 2/SYS | Y | Y | | | |
| 4A | TB4-9,10 | I6U | 41 | 3 | 4 | 4 | Y | Y | | | |
| 4B | TB4-11,12 | I6L | 45 | 7 | 14 | 4 | Y | Y | | | 10 |
| 4C | TB6-1,2 | I7U | 65 | 27 | 34 | 4 | Y | Y | | | 10 |
| 5A | TB3-1,2 | J1U | 55 | 17 | 5 | 5 | Y | Y | | | 3 |
| 6A/S4 | TB3-5,6 | J2U | 40 | 2 | 6 | 6/SYS | Y | Y | | | |
| 6B/S5 | TB3-7,8 | J2L | 44 | 6 | 16 | 6/SYS | Y | Y | | | |
| 8A | TB5-9,10 | J6U | 42 | 4 | 8 | 8 | Y | Y | | | 3 |
| 8B | TB5-11,12 | J6L | 46 | 8 | 18 | 8 | Y | Y | | | 10 |

INPUT FILE POSITION LEGEND: J2L



THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 12-0922T3
 DESIGNED: September 2016
 SEALED: 11-08-2016
 REVISED:

Temporary Signal
 Phase 1, Step 5

DOCUMENT NOT CONSIDERED FINAL
 UNLESS ALL SIGNATURES COMPLETED

ELECTRICAL AND PROGRAMMING DETAILS FOR:

US 321 (N. Chester Street)
 at
 Bulb Avenue / Tulip Drive

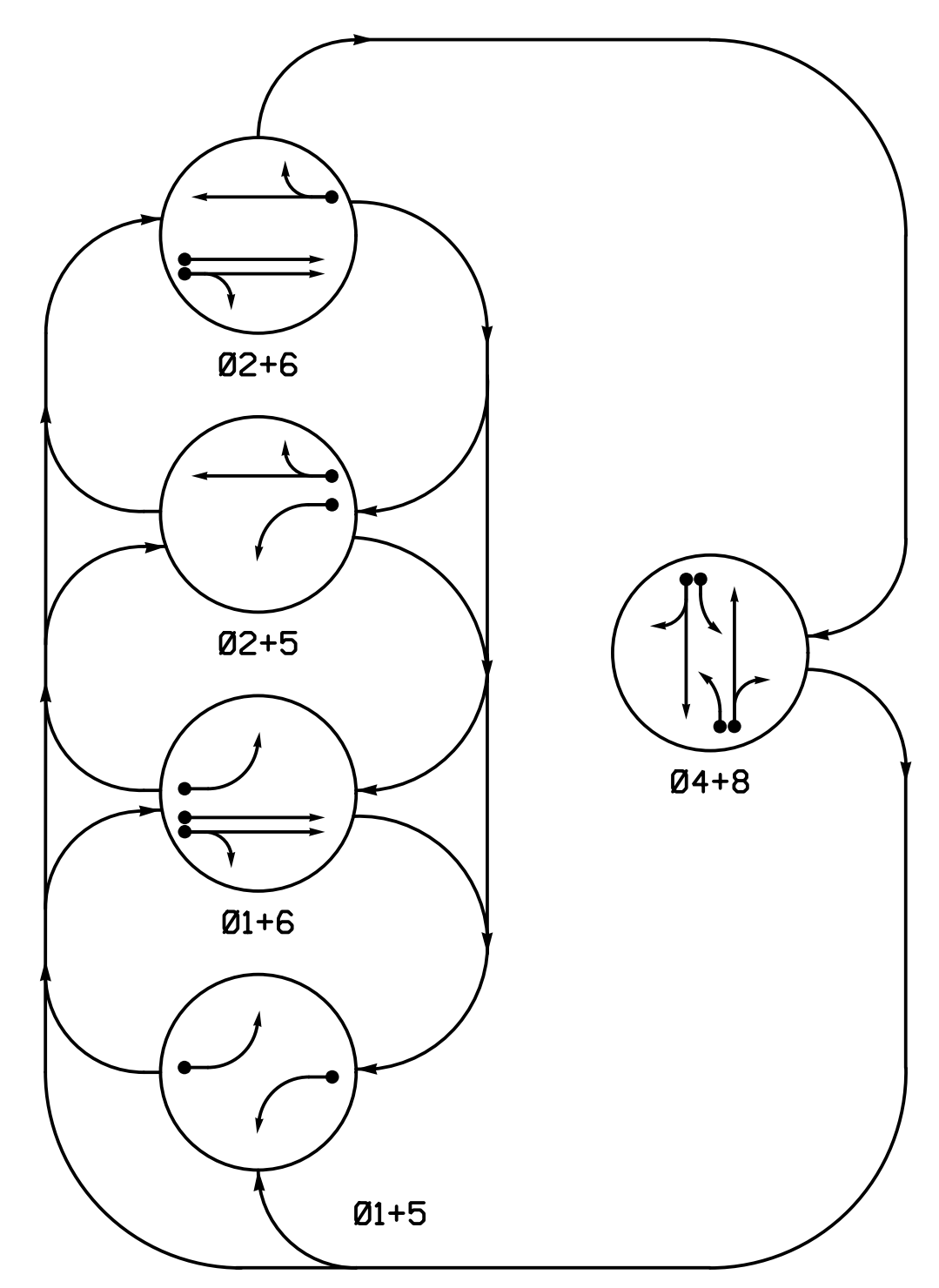
SEAL

| Division 12 | Gastonia Co. | Gastonia |
|---------------------------|---------------------------|----------|
| PLAN DATE: September 2016 | REVIEWED BY: T.R. Terrell | |
| PREPARED BY: J.A. Wagner | REVIEWED BY: N.R. Simmons | |
| REVISIONS | INIT. | DATE |
| | | |

HNTB HNTB NORTH CAROLINA, P.C.
 343 E. Six Forks Road, Suite 200
 Raleigh, North Carolina 27609
 NC License No: C-1554
 (919) 546-8997

DocuSigned by:
 Natasha R. Simmons
 11/8/2016
 SIGNATURE DATE
 SIG. INVENTORY NO. 12-0922T3

PHASING DIAGRAM

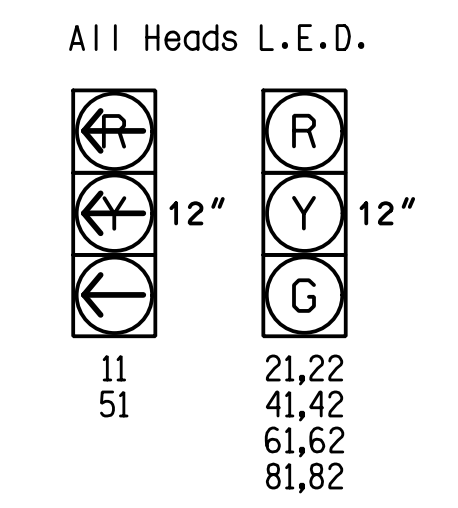


PHASING DIAGRAM DETECTION LEGEND

- ←● DETECTED MOVEMENT
- ← UNDETECTED MOVEMENT (OVERLAP)
- ←..... UNSIGNALIZED MOVEMENT
- ←- - - PEDESTRIAN MOVEMENT

| SIGNAL FACE | PHASE | | | | | | | |
|-------------|-------|------|------|------|------|------|------|------|
| | Ø1+5 | Ø1+6 | Ø2+5 | Ø2+6 | Ø4+8 | Ø1+5 | Ø1+6 | Ø2+5 |
| 11 | - | - | R | R | R | R | R | R |
| 21,22 | R | R | G | G | R | Y | | |
| 41,42 | R | R | R | R | G | R | | |
| 51 | - | R | - | R | R | R | | |
| 61,62 | R | G | R | G | R | Y | | |
| 81,82 | R | R | R | R | G | R | | |

SIGNAL FACE I.D.

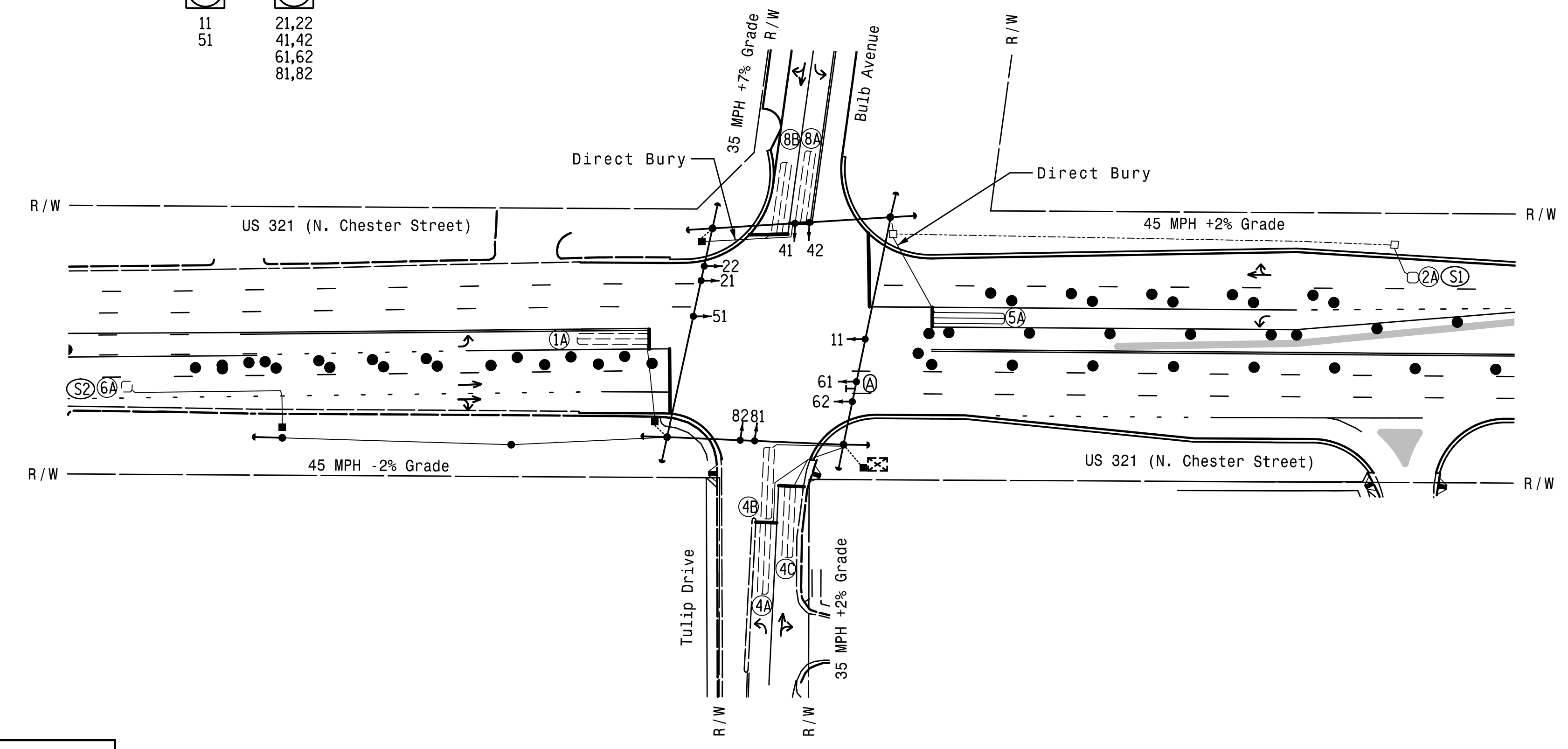


| OASIS 2070 LOOP & DETECTOR INSTALLATION CHART | | | | | | | | | | |
|---|-----------|----------------------------|-------|----------|----------------------|---------|-----------|-----------------|--------------|------------|
| INDUCTIVE LOOPS | | | | | DETECTOR PROGRAMMING | | | | | |
| LOOP | SIZE (FT) | DISTANCE FROM STOPBAR (FT) | TURNS | NEW LOOP | PHASE | CALLING | EXTENSION | FULL TIME DELAY | STRETCH TIME | DELAY TIME |
| 1A | 6X40 | 0 | 2-4-2 | - | 1 | Y | Y | - | - | 3 |
| 2A/S1 | 6X6 | 300 | 5 | Y | 2 | Y | Y | - | - | Y |
| 4A | 6X40 | EXIST | 2-4-2 | - | 4 | Y | Y | - | - | - |
| 4B | 6X40 | EXIST | 2-4-2 | - | 4 | Y | Y | - | - | 10 |
| 4C | 6X40 | EXIST | 2-4-2 | - | 4 | Y | Y | - | - | 10 |
| 5A | 6X40 | 0 | 2-4-2 | Y | 5 | Y | Y | - | - | - |
| 6A/S2 | 6X6 | 300 | 5 | - | 6 | Y | Y | - | - | - |
| 8A | 6X40 | 0 | 2-4-2 | - | 8 | Y | Y | - | - | 3 |
| 8B | 6X40 | 0 | 2-4-2 | - | 8 | Y | Y | - | - | 10 |

5 Phase Fully Actuated (Gastonia City Signal System)

NOTES

- Refer to "Roadway Standard Drawings NCDOT" dated January 2012 and "Standard Specifications for Roads and Structures" dated January 2012.
- Do not program signal for late night flashing operation unless otherwise instructed by the Engineer.
- Phase 1 and/or phase 5 may be lagged.
- Reposition existing signal heads 21, 22, 51, 61 and 62.
- Set all detector units to presence mode.
- Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.
- Signal System data: Controller Asset #0922.



| OASIS 2070 TIMING CHART | | | | | | |
|-------------------------|-------|------------|-----|-----|------------|-----|
| FEATURE | PHASE | | | | | |
| | 1 | 2 | 4 | 5 | 6 | 8 |
| Min Green 1 * | 7 | 12 | 7 | 7 | 12 | 7 |
| Extension 1 * | 2.0 | 6.0 | 2.0 | 2.0 | 6.0 | 2.0 |
| Max Green 1 * | 20 | 90 | 25 | 20 | 90 | 25 |
| Yellow Clearance | 3.0 | 4.3 | 3.7 | 3.0 | 4.7 | 3.5 |
| Red Clearance | 3.3 | 1.0 | 2.7 | 3.5 | 1.3 | 2.4 |
| Red Revert | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 |
| Walk 1 * | - | - | - | - | - | - |
| Don't Walk 1 | - | - | - | - | - | - |
| Seconds Per Actuation * | - | 1.5 | - | - | 1.5 | - |
| Max Variable Initial * | - | 34 | - | - | 34 | - |
| Time Before Reduction * | - | 15 | - | - | 15 | - |
| Time To Reduce * | - | 30 | - | - | 30 | - |
| Minimum Gap | - | 3.0 | - | - | 3.0 | - |
| Recall Mode | - | MIN RECALL | - | - | MIN RECALL | - |
| Vehicle Call Memory | - | YELLOW | - | - | YELLOW | - |
| Dual Entry | - | - | ON | - | - | ON |
| Simultaneous Gap | ON | ON | ON | ON | ON | ON |

* These values may be field adjusted. Do not adjust Min Green and Extension times for phases 2 and 6 lower than what is shown. Min Green for all other phases should not be lower than 4 seconds.

| PROPOSED | | EXISTING | |
|----------|--|----------|-----|
| ○→ | Traffic Signal Head | ●→ | N/A |
| ○→ | Modified Signal Head | ○→ | N/A |
| ○→ | Sign | ○→ | N/A |
| ○→ | Pedestrian Signal Head With Push Button & Sign | ○→ | N/A |
| ○→ | Signal Pole with Guy | ○→ | N/A |
| ○→ | Signal Pole with Sidewalk Guy | ○→ | N/A |
| ○→ | Inductive Loop Detector | ○→ | N/A |
| □ | Controller & Cabinet | □ | N/A |
| □ | Junction Box | □ | N/A |
| ○→ | 2-in Underground Conduit | ○→ | N/A |
| N/A | Right of Way | --- | N/A |
| N/A | Directional Arrow | → | N/A |
| N/A | Wheelchair Ramp | ▲ | N/A |
| ⓐ | "DO NOT BLOCK INTERSECTION" Sign (R10-7) | ⓐ | N/A |
| ■ | Construction Zone | ■ | N/A |
| ● | Construction Zone Drums | ● | N/A |

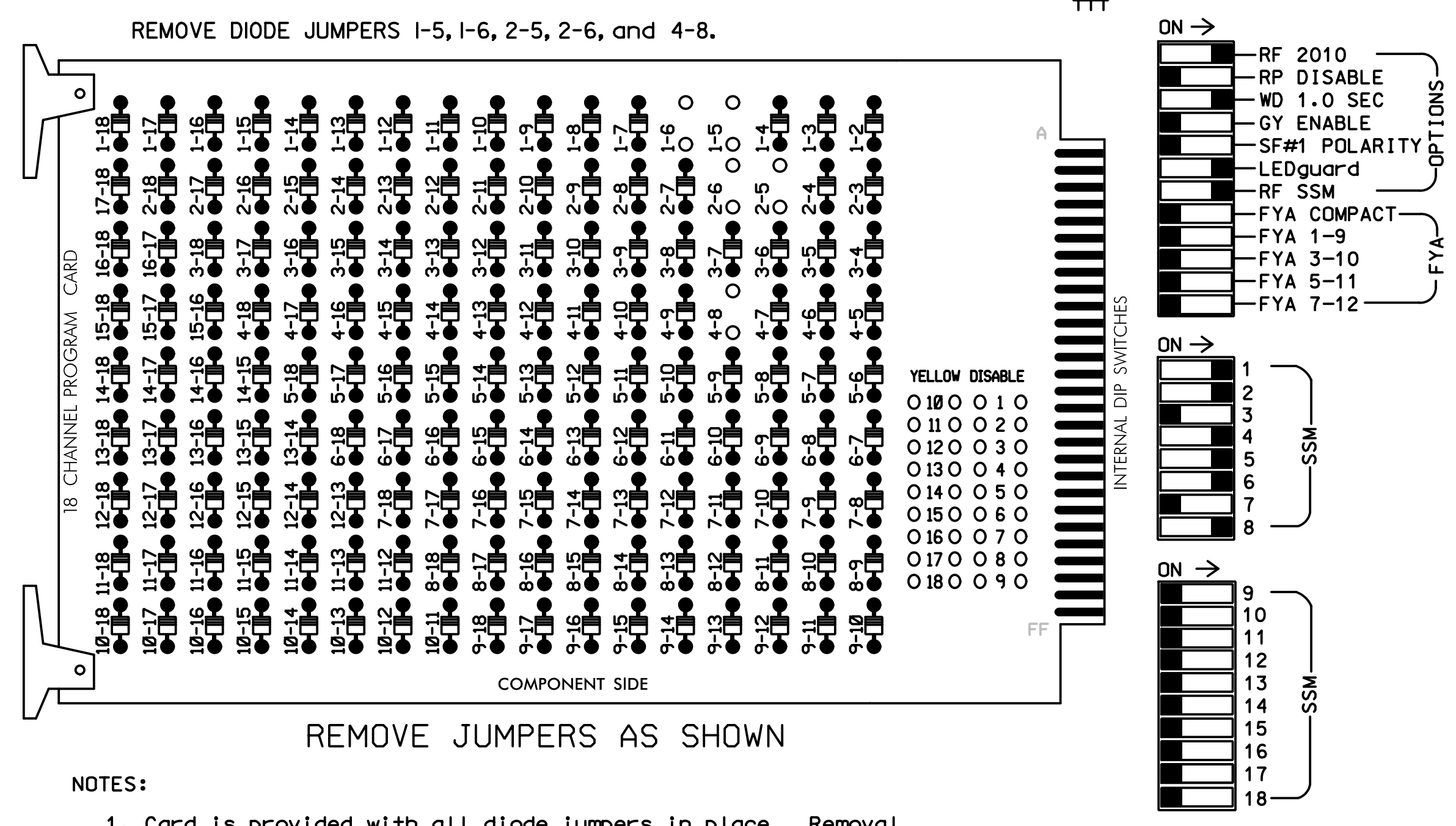
Temporary Signal Phase 1, Steps 6 & 7

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

| | | | |
|---|---|---|------|
| | US 321 (N. Chester Street) at Bulb Avenue / Tulip Drive | | |
| | Division 12 Gaston Co. Gastonia | PLAN DATE: September 2016 REVIEWED BY: T.R. Terrell | |
| PREPARED BY: J.A. Wagner | REVIEWED BY: N.R. Simmons | Documented by: 11/8/2016 | |
| REVISIONS | | INITI. | DATE |
| SCALE 1"=50' | | SIGNATURE DATE | |
| HNTB NORTH CAROLINA, P.C. 343 E. Six Forks Road, Suite 200 Raleigh, North Carolina 27609 NC License No: C-1554 (919) 546-8997 | | SIG. INVENTORY NO. 12-0922TA | |

EDI MODEL 2018ECL-NC CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)



NOTES:

1. Card is provided with all diode jumpers in place. Removal of any jumper allows its channels to run concurrently.
2. Ensure jumpers SEL2-SEL5 and SEL9 are present on the monitor board.
3. Ensure that Red Enable is active at all times during normal operation.
4. Connect serial cable from conflict monitor to comm. port 1 of 2070 controller. Ensure conflict monitor communicates with 2070.

NOTES

1. To prevent "flash-conflict" problems, insert red flash program blocks for all unused vehicle load switches in the output file. The installer shall verify that signal heads flash in accordance with the Signal Plans.
2. Program phases 4 and 8 for Dual Entry.
3. Enable Simultaneous Gap-Out for all phases.
4. Program phases 2 and 6 for Variable Initial and Gap Reduction.
5. Program phases 2 and 6 for Start Up In Green.
6. Program phases 2 and 6 for Yellow Flash.
7. The cabinet and controller are part of the Gastonia City System.

EQUIPMENT INFORMATION

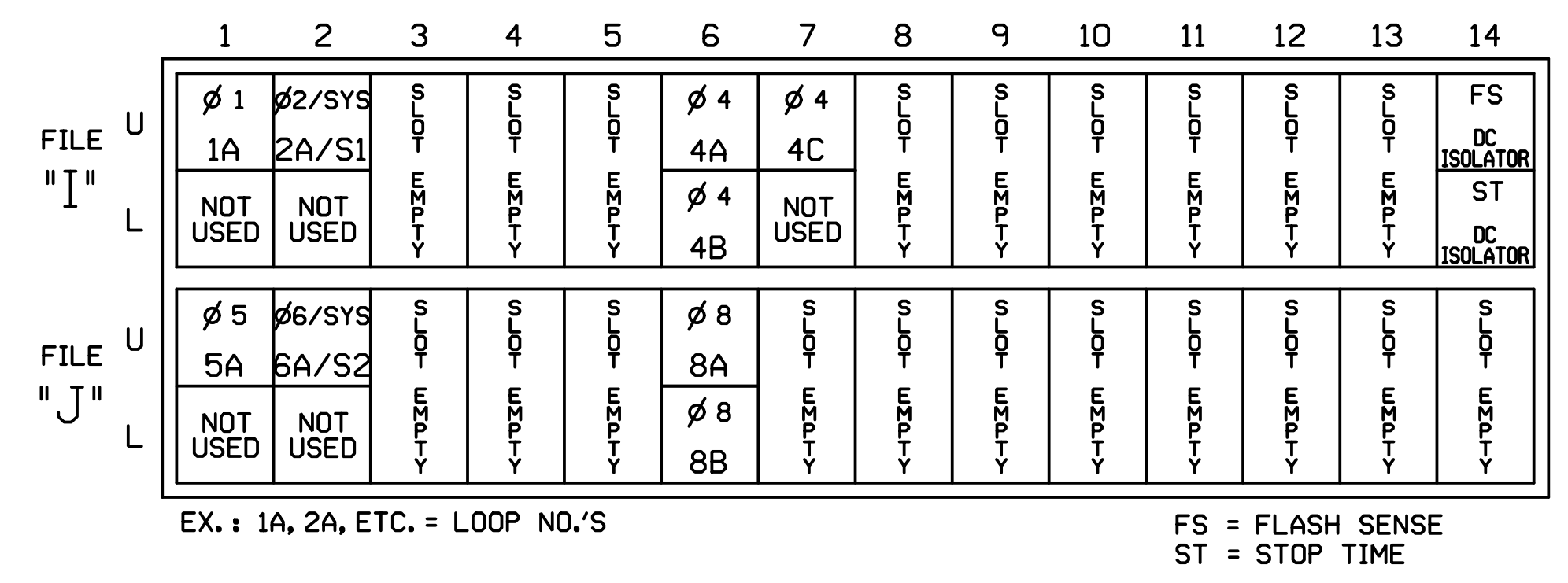
CONTROLLER.....2070
 CABINET.....332
 SOFTWARE.....ECONOLITE OASIS
 CABINET MOUNT.....BASE
 OUTPUT FILE POSITIONS...12
 LOAD SWITCHES USED.....S1,S2,S5,S7,S8,S11
 PHASES USED.....1,2,4,5,6,8
 OVERLAPS.....NONE

SIGNAL HEAD HOOK-UP CHART

| LOAD SWITCH NO. | S1 | S2 | S3 | S4 | S5 | S6 | S7 | S8 | S9 | S10 | S11 | S12 |
|-----------------|-----|-------|-------|----|-------|-------|----|-------|-------|-----|-------|-------|
| CMU CHANNEL NO. | 1 | 2 | 13 | 3 | 4 | 14 | 5 | 6 | 15 | 7 | 8 | 16 |
| PHASE | 1 | 2 | 2 PED | 3 | 4 | 4 PED | 5 | 6 | 6 PED | 7 | 8 | 8 PED |
| SIGNAL HEAD NO. | 11 | 21,22 | NU | NU | 41,42 | NU | 51 | 61,62 | NU | NU | 81,82 | NU |
| RED | | 128 | | | 101 | | | 134 | | | 107 | |
| YELLOW | | 129 | | | 102 | | | 135 | | | 108 | |
| GREEN | | 130 | | | 103 | | | 136 | | | 109 | |
| RED ARROW | 125 | | | | | | | 131 | | | | |
| YELLOW ARROW | 126 | | | | | | | 132 | | | | |
| GREEN ARROW | 127 | | | | | | | 133 | | | | |
| Hand icon | | | | | | | | | | | | |
| Person icon | | | | | | | | | | | | |

NU = Not Used

INPUT FILE POSITION LAYOUT



INPUT FILE CONNECTION & PROGRAMMING CHART

| LOOP NO. | LOOP TERMINAL | INPUT FILE POS. | PIN NO. | INPUT ASSIGNMENT NO. | DETECTOR NO. | NEMA PHASE | CALL | EXTEND | FULL TIME DELAY | STRETCH TIME | DELAY TIME |
|----------|---------------|-----------------|---------|----------------------|--------------|------------|------|--------|-----------------|--------------|------------|
| 1A | TB2-1,2 | I1U | 56 | 18 | 1 | 1 | Y | Y | | | 3 |
| 2A/S1 | TB2-5,6 | I2U | 39 | 1 | 2 | 2/SYS | Y | Y | | | |
| 4A | TB4-9,10 | I6U | 41 | 3 | 4 | 4 | Y | Y | | | |
| 4B | TB4-11,12 | I6L | 45 | 7 | 14 | 4 | Y | Y | | | 10 |
| 4C | TB6-1,2 | I7U | 65 | 27 | 34 | 4 | Y | Y | | | 10 |
| 5A | TB3-1,2 | J1U | 55 | 17 | 5 | 5 | Y | Y | | | |
| 6A/S2 | TB3-5,6 | J2U | 40 | 2 | 6 | 6/SYS | Y | Y | | | |
| 8A | TB5-9,10 | J6U | 42 | 4 | 8 | 8 | Y | Y | | | 3 |
| 8B | TB5-11,12 | J6L | 46 | 8 | 18 | 8 | Y | Y | | | 10 |

INPUT FILE POSITION LEGEND: J2L
 FILE J
 SLOT 2
 LOWER

THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 12-0922T4
 DESIGNED: September 2016
 SEALED: 11-08-2016
 REVISED:

Temporary Signal
Phase 1, Steps 6 & 7

**DOCUMENT NOT CONSIDERED FINAL
UNLESS ALL SIGNATURES COMPLETED**

ELECTRICAL AND PROGRAMMING DETAILS FOR:

Prepared for:
 US 321 (N. Chester Street)
 at
 Bulb Avenue / Tulip Drive
 Division 12 Gaston Co. Gastonia
 PLAN DATE: September 2016 REVIEWED BY: T.R. Terrell
 PREPARED BY: J.A. Wagner REVIEWED BY: N.R. Simmons

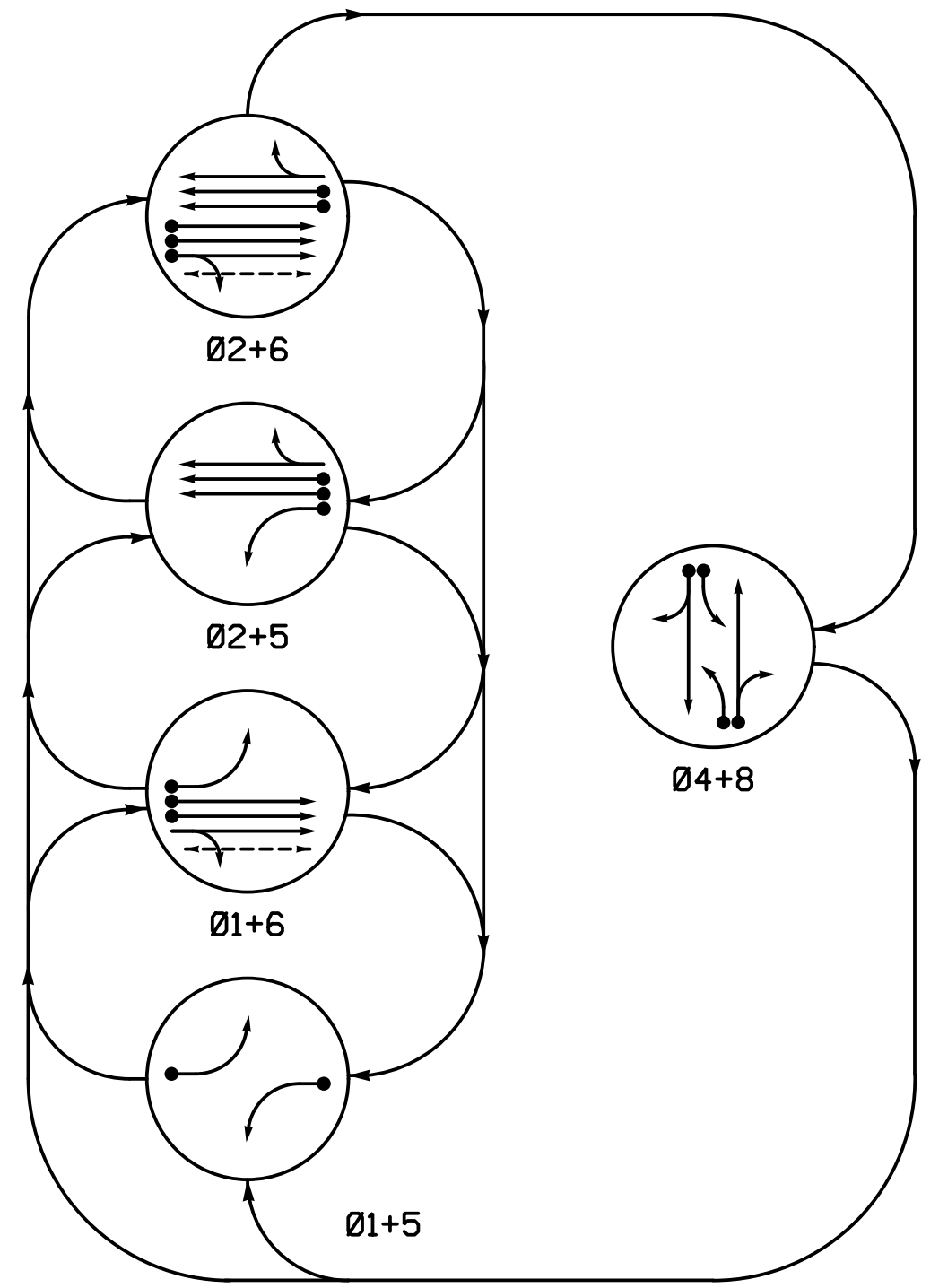
| REVISIONS | INIT. | DATE |
|-----------|-------|------|
| | | |

SEAL

DocuSigned by:
 Natasha R. Simmons
 11/8/2016
 SIGNATURE DATE
 SIG. INVENTORY NO. 12-0922T4

HNTB HNTB NORTH CAROLINA, P.C.
 343 E. Six Forks Road, Suite 200
 Raleigh, North Carolina 27609
 NC License No: C-1554
 (919) 546-8997

PHASING DIAGRAM



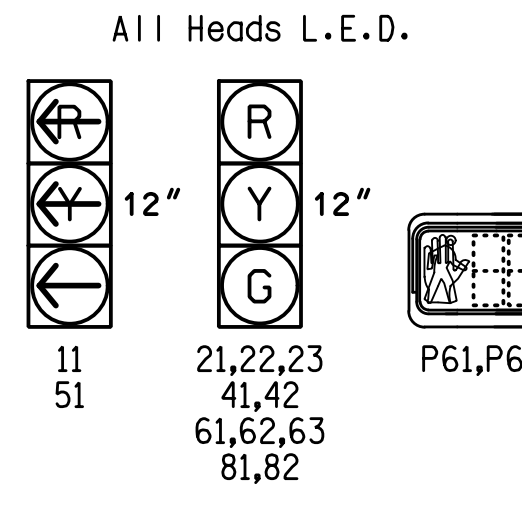
PHASING DIAGRAM DETECTION LEGEND

- ←● DETECTED MOVEMENT
- ← UNDETECTED MOVEMENT (OVERLAP)
- ⋯ UNSIGNALIZED MOVEMENT
- ←- - PEDESTRIAN MOVEMENT

TABLE OF OPERATION

| SIGNAL FACE | PHASE | | | | | FLASH |
|-------------|-------|------|------|------|-------|-------|
| | 01+5 | 02+5 | 02+6 | 04+8 | FLASH | |
| 11 | - | - | - | - | - | - |
| 21,22,23 | R | R | G | G | R | Y |
| 41,42 | R | R | R | R | G | R |
| 51 | - | - | - | - | - | - |
| 61,62,63 | R | G | R | G | R | Y |
| 81,82 | R | R | R | R | G | R |
| P61,P62 | DW | W | DW | W | DW | DRK |

SIGNAL FACE I.D.



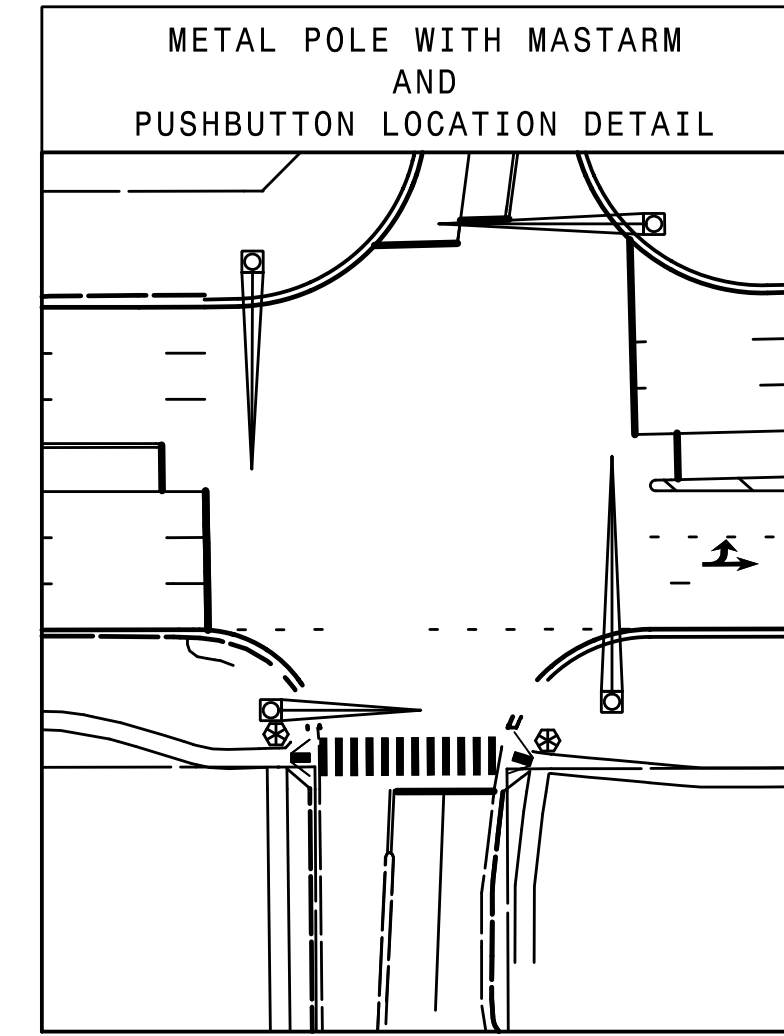
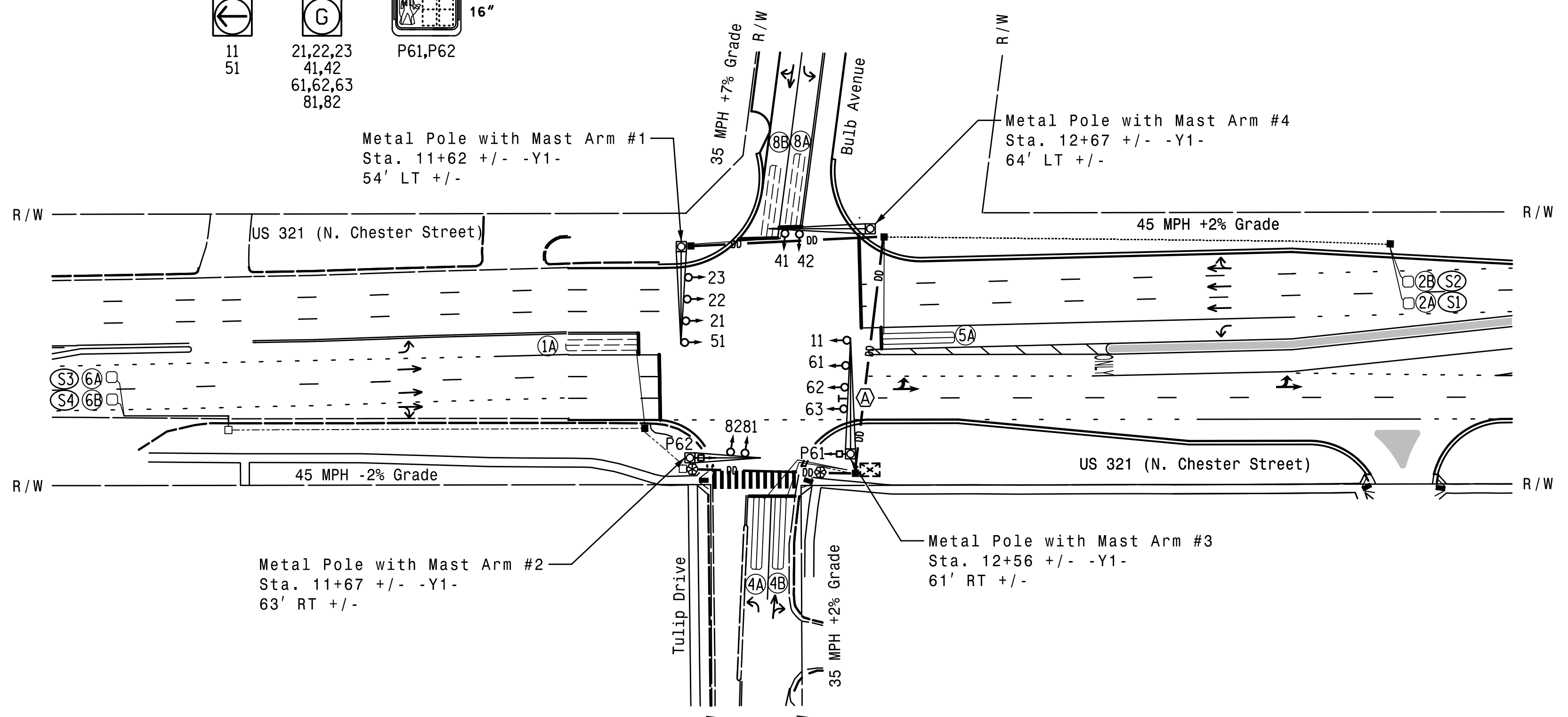
OASIS 2070 LOOP & DETECTOR INSTALLATION CHART

| LOOP | SIZE (FT) | DISTANCE FROM STOPBAR (FT) | TURNS | NEW LOOP | DETECTOR PROGRAMMING | | | | SYSTEM LOOP | NEW CARD |
|-------|-----------|----------------------------|-------|----------|----------------------|---------|-----------|-----------------|-------------|----------|
| | | | | | PHASE | CALLING | EXTENSION | FULL TIME DELAY | | |
| 1A | 6X40 | 0 | 2-4-2 | - | 1 | Y | Y | - | 3 | - |
| 2A/S1 | 6X6 | 300 | 5 | Y | 2 | Y | Y | - | - | Y |
| 2B/S2 | 6X6 | 300 | 5 | Y | 2 | Y | Y | - | - | Y |
| 4A | 6X40 | 0 | 2-4-2 | Y | 4 | Y | Y | - | 3 | - |
| 4B | 6X40 | 0 | 2-4-2 | Y | 4 | Y | Y | - | 10 | - |
| 5A | 6X40 | 0 | 2-4-2 | Y | 5 | Y | Y | - | 3 | - |
| 6A/S3 | 6X6 | 300 | 5 | Y | 6 | Y | Y | - | - | Y |
| 6B/S4 | 6X6 | 300 | 5 | Y | 6 | Y | Y | - | - | Y |
| 8A | 6X40 | 0 | 2-4-2 | - | 8 | Y | Y | - | 3 | - |
| 8B | 6X40 | 0 | 2-4-2 | - | 8 | Y | Y | - | 10 | - |

5 Phase Fully Actuated (Gastonia City Signal System)

NOTES

- Refer to "Roadway Standard Drawings NCDOT" dated January 2012 and "Standard Specifications for Roads and Structures" dated January 2012.
- Do not program signal for late night flashing operation unless otherwise instructed by the Engineer.
- Phase 1 and/or phase 5 may be lagged.
- Set all detector units to presence mode.
- Omit "WALK" and flashing "DON'T WALK" with no pedestrian calls.
- Program pedestrian heads to countdown the flashing "Don't Walk" time only.
- Pedestrian pedestals and push buttons are conceptual and shown for reference only. See sheets P1-P3 for push button location details.
- Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.
- Signal System data: Controller Asset #0922.



OASIS 2070 TIMING CHART

| FEATURE | PHASE | | | | | |
|-------------------------|-------|------------|-----|-----|------------|-----|
| | 1 | 2 | 4 | 5 | 6 | 8 |
| Min Green 1 * | 7 | 12 | 7 | 7 | 12 | 7 |
| Extension 1 * | 2.0 | 6.0 | 2.0 | 2.0 | 6.0 | 2.0 |
| Max Green 1 * | 20 | 90 | 25 | 20 | 90 | 25 |
| Yellow Clearance | 3.0 | 4.3 | 3.7 | 3.0 | 4.7 | 3.5 |
| Red Clearance | 3.3 | 1.1 | 2.7 | 3.4 | 1.3 | 2.6 |
| Red Revert | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 |
| Walk 1 * | - | - | - | - | 4 | - |
| Don't Walk 1 | - | - | - | - | 9 | - |
| Seconds Per Actuation * | - | 1.5 | - | - | 1.5 | - |
| Max Variable Initial * | - | 34 | - | - | 34 | - |
| Time Before Reduction * | - | 15 | - | - | 15 | - |
| Time To Reduce * | - | 30 | - | - | 30 | - |
| Minimum Gap | - | 3.0 | - | - | 3.0 | - |
| Recall Mode | - | MIN RECALL | - | - | MIN RECALL | - |
| Vehicle Call Memory | - | YELLOW | - | - | YELLOW | - |
| Dual Entry | - | - | ON | - | - | ON |
| Simultaneous Gap | ON | ON | ON | ON | ON | ON |

LEGEND

- | | | | |
|--|--|--|----------|
| | Traffic Signal Head | | EXISTING |
| | Modified Signal Head | | N/A |
| | Pedestrian Signal Head | | N/A |
| | Signal Pole with Guy | | N/A |
| | Signal Pole with Sidewalk Guy | | N/A |
| | Inductive Loop Detector | | N/A |
| | Controller & Cabinet | | N/A |
| | Junction Box | | N/A |
| | 2-in Underground Conduit | | N/A |
| | Right of Way | | N/A |
| | Directional Arrow | | N/A |
| | Metal Pole with Mastarm | | N/A |
| | Directional Drill | | N/A |
| | Type I Pushbutton Post | | N/A |
| | "DO NOT BLOCK INTERSECTION" Sign (R10-7) | | N/A |

Signal Upgrade - Final Design

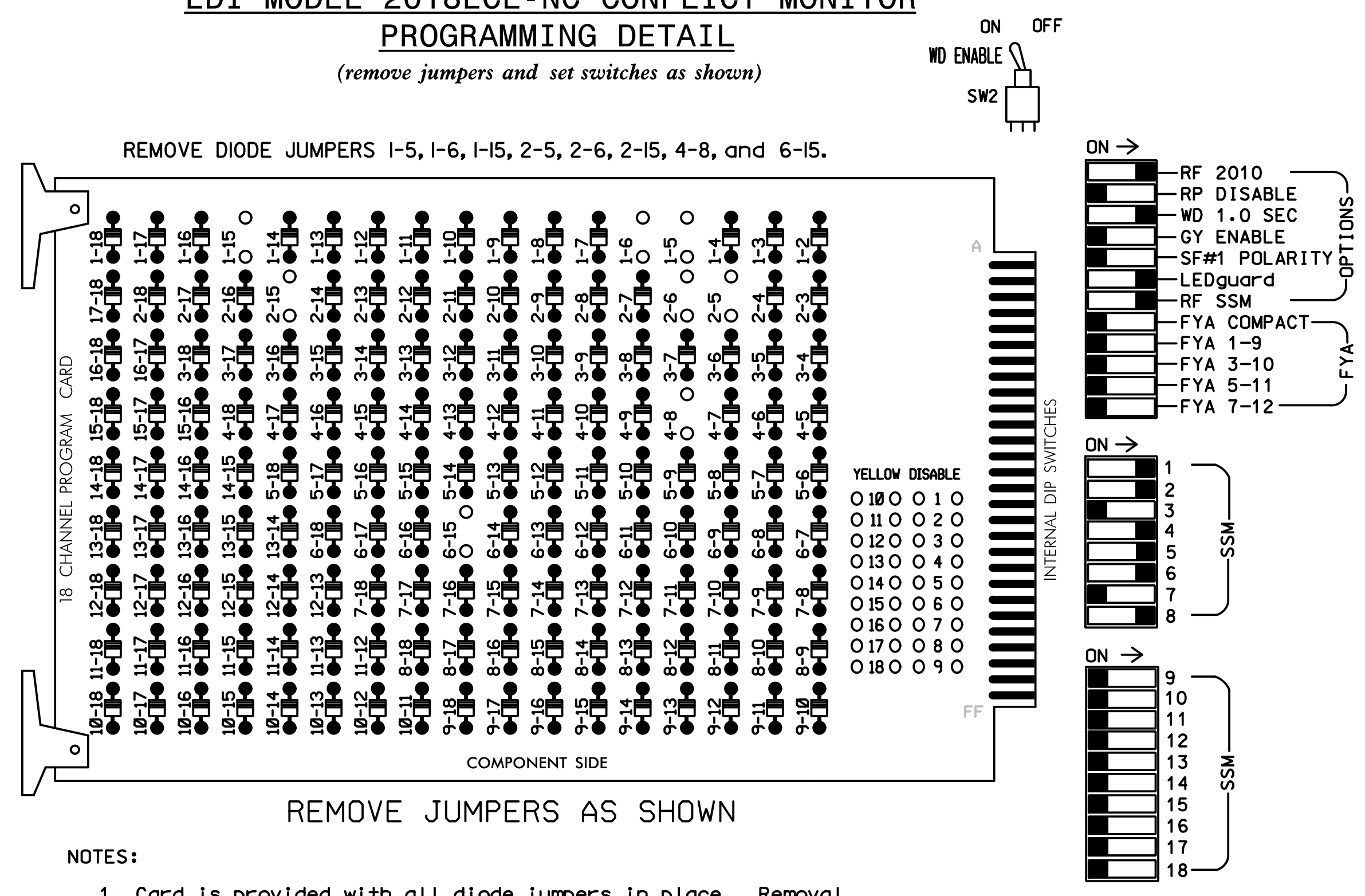
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

| | | | |
|---|---|--------------------------|---------------------------|
| | US 321 (N. Chester Street) at Bulb Avenue / Tulip Drive | | |
| | Division 12 Gaston Co. | Gastonia | |
| PLAN DATE: September 2016 | REVIEWED BY: T.R. Terrell | PREPARED BY: J.A. Wagner | REVIEWED BY: N.R. Simmons |
| SCALE: 1"=50' | | REVISIONS: | |
| HNTB NORTH CAROLINA, P.C. 343 E. Six Forks Road, Suite 200 Raleigh, North Carolina 27609 NC License No: C-1554 (919) 546-8997 | | DOCUMENT CONTROL: | |

* These values may be field adjusted. Do not adjust Min Green and Extension times for phases 2 and 6 lower than what is shown. Min Green for all other phases should not be lower than 4 seconds.

EDI MODEL 2018ECL-NC CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)



NOTES:

- Card is provided with all diode jumpers in place. Removal of any jumper allows its channels to run concurrently.
- Ensure jumpers SEL2-SEL5 and SEL9 are present on the monitor board.
- Ensure that Red Enable is active at all times during normal operation.
- Connect serial cable from conflict monitor to comm. port 1 of 2070 controller. Ensure conflict monitor communicates with 2070.

NOTES

- To prevent "flash-conflict" problems, insert red flash program blocks for all unused vehicle load switches in the output file. The installer shall verify that signal heads flash in accordance with the Signal Plans.
- Program phases 4 and 8 for Dual Entry.
- Enable Simultaneous Gap-Out for all phases.
- Program phases 2 and 6 for Variable Initial and Gap Reduction.
- Program phases 2 and 6 for Start Up In Green.
- Program phase 6 for 'STARTUP PED CALL'.
- Program phases 2 and 6 for Yellow Flash.
- The cabinet and controller are part of the Gastonia City Signal System.

EQUIPMENT INFORMATION

CONTROLLER.....2070
 CABINET.....332
 SOFTWARE.....ECONOLITE OASIS
 CABINET MOUNT.....BASE
 OUTPUT FILE POSITIONS...12
 LOAD SWITCHES USED.....S1,S2,S5,S7,S8,S9,S11
 PHASES USED.....1,2,4,5,6,6PED,8
 OVERLAPS.....NONE

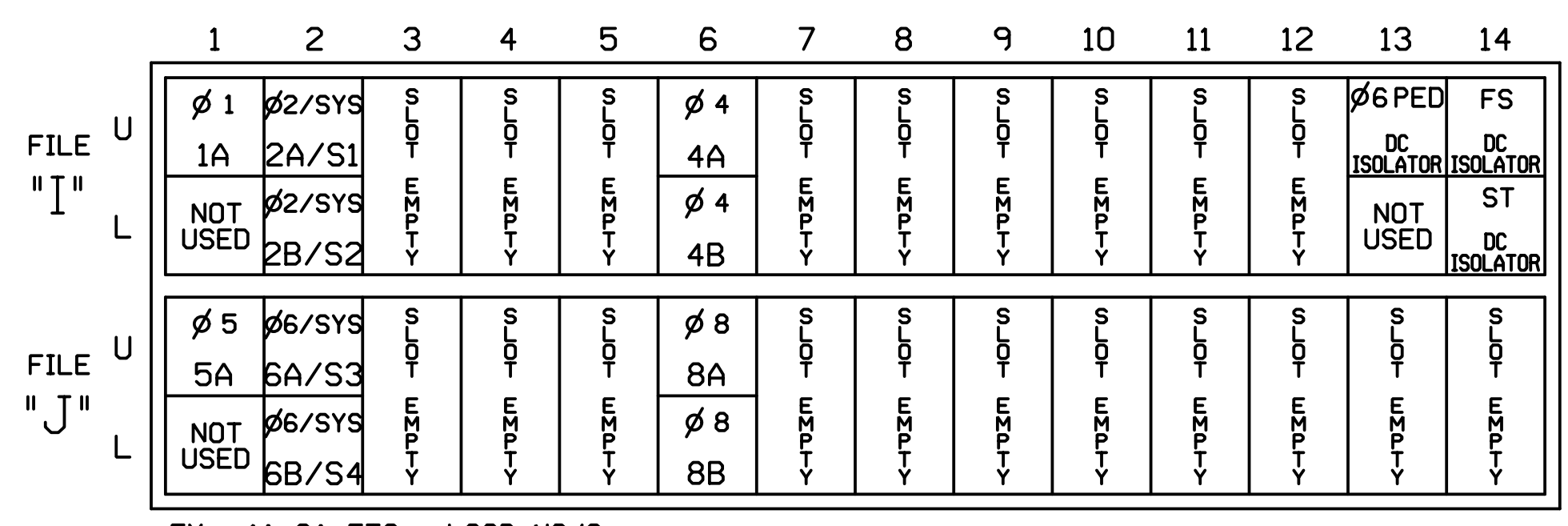
SIGNAL HEAD HOOK-UP CHART

| LOAD SWITCH NO. | S1 | S2 | S3 | S4 | S5 | S6 | S7 | S8 | S9 | S10 | S11 | S12 |
|---------------------|-----|----------|-------|----|-------|-------|----|----------|----------|-----|-------|-------|
| CMU CHANNEL NO. | 1 | 2 | 13 | 3 | 4 | 14 | 5 | 6 | 15 | 7 | 8 | 16 |
| PHASE | 1 | 2 | 2 PED | 3 | 4 | 4 PED | 5 | 6 | 6 PED | 7 | 8 | 8 PED |
| SIGNAL HEAD NO. | 11 | 21,22,23 | NU | NU | 41,42 | NU | 51 | 61,62,63 | P61, P62 | NU | 81,82 | NU |
| RED | | 128 | | | 101 | | | 134 | | | 107 | |
| YELLOW | | 129 | | | 102 | | | 135 | | | 108 | |
| GREEN | | 130 | | | 103 | | | 136 | | | 109 | |
| RED ARROW | 125 | | | | | | | 131 | | | | |
| YELLOW ARROW | 126 | | | | | | | 132 | | | | |
| GREEN ARROW | 127 | | | | | | | 133 | | | | |
| Hand icon | | | | | | | | | 119 | | | |
| Walking person icon | | | | | | | | | | 121 | | |

NU = Not Used

INPUT FILE POSITION LAYOUT

(front view)



EX. : 1A, 2A, ETC. = LOOP NO.'S

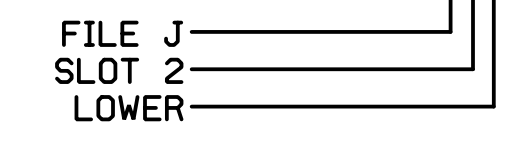
FS = FLASH SENSE
 ST = STOP TIME
 PRE = PREEMPT

INPUT FILE CONNECTION & PROGRAMMING CHART

| LOOP NO. | LOOP TERMINAL | INPUT FILE POS. | PIN NO. | INPUT ASSIGNMENT NO. | DETECTOR NO. | NEMA PHASE | CALL | EXTEND | FULL TIME DELAY | STRETCH TIME | DELAY TIME |
|------------------|---------------|-----------------|---------|----------------------|--------------|------------|------|--------|-----------------|--------------|------------|
| 1A | TB2-1,2 | I1U | 56 | 18 | 1 | 1 | Y | Y | | | 3 |
| 2A/S1 | TB2-5,6 | I2U | 39 | 1 | 2 | 2/SYS | Y | Y | | | |
| 2B/S2 | TB2-7,8 | I2L | 43 | 5 | 12 | 2/SYS | Y | Y | | | |
| 4A | TB4-9,10 | I6U | 41 | 3 | 4 | 4 | Y | Y | | | 3 |
| 4B | TB4-11,12 | I6L | 45 | 7 | 14 | 4 | Y | Y | | | 10 |
| 5A | TB3-1,2 | J1U | 55 | 17 | 5 | 5 | Y | Y | | | 3 |
| 6A/S3 | TB3-5,6 | J2U | 40 | 2 | 6 | 6/SYS | Y | Y | | | |
| 6B/S4 | TB3-7,8 | J2L | 44 | 6 | 16 | 6/SYS | Y | Y | | | |
| 8A | TB5-9,10 | J6U | 42 | 4 | 8 | 8 | Y | Y | | | 3 |
| 8B | TB5-11,12 | J6L | 46 | 8 | 18 | 8 | Y | Y | | | 10 |
| PED PUSH BUTTONS | | | | | | | | | | | |
| P61,P62 | TB8-7,9 | I13U | 68 | 30 | PED 6 | 6 PED | | | | | |

NOTE:
 INSTALL DC ISOLATOR IN INPUT FILE SLOT 113.

INPUT FILE POSITION LEGEND: J2L



COUNTDOWN PEDESTRIAN SIGNAL OPERATION

Countdown Ped Signals are required to display timing only during Ped Clearance Interval. Consult Ped Signal Module user's manual for instructions on selecting this feature.

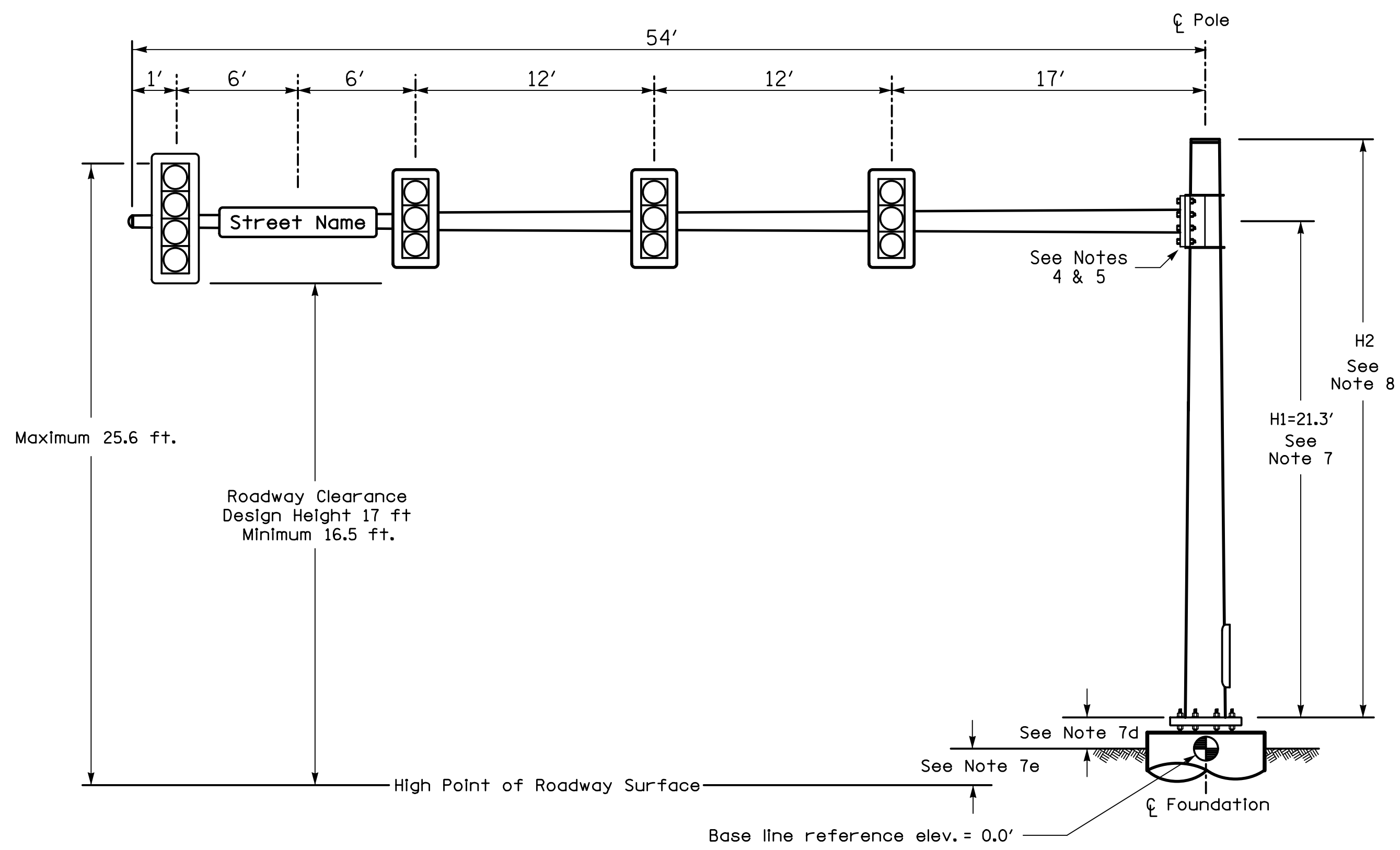
THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 12-0922
 DESIGNED: September 2016
 SEALED: 11-08-2016
 REVISED:

Signal Upgrade - Final Design

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

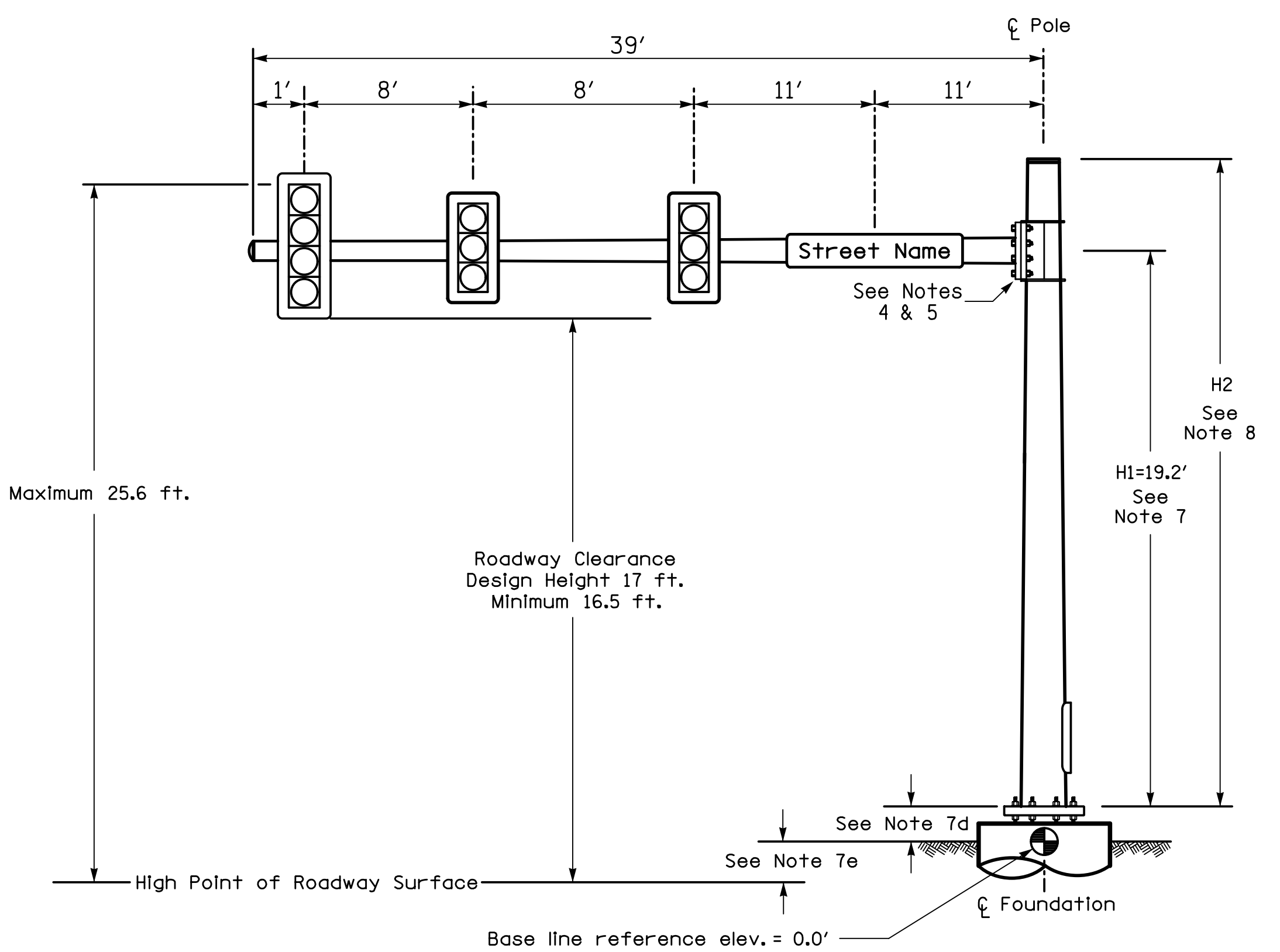
| | | | |
|--|---|--|---|
| | Prepared for | US 321 (N. Chester Street) at Bulb Avenue / Tulip Drive Division 12 Gaston Co. Gastonia | SEAL |
| | HNTB NORTH CAROLINA, P.C. 343 E. Six Forks Road, Suite 200 Raleigh, North Carolina 27609 NC License No: C-1554 (919) 546-8997 | PLAN DATE: September 2016 PREPARED BY: J.A. Wagner REVISIONS: | REVIEWED BY: T.R. Terrell REVIEWED BY: N.R. Simmons DATE: 11/8/2016 |

Design Loading for METAL POLE NO. 1



Elevation View

Design Loading for METAL POLE NO. 2

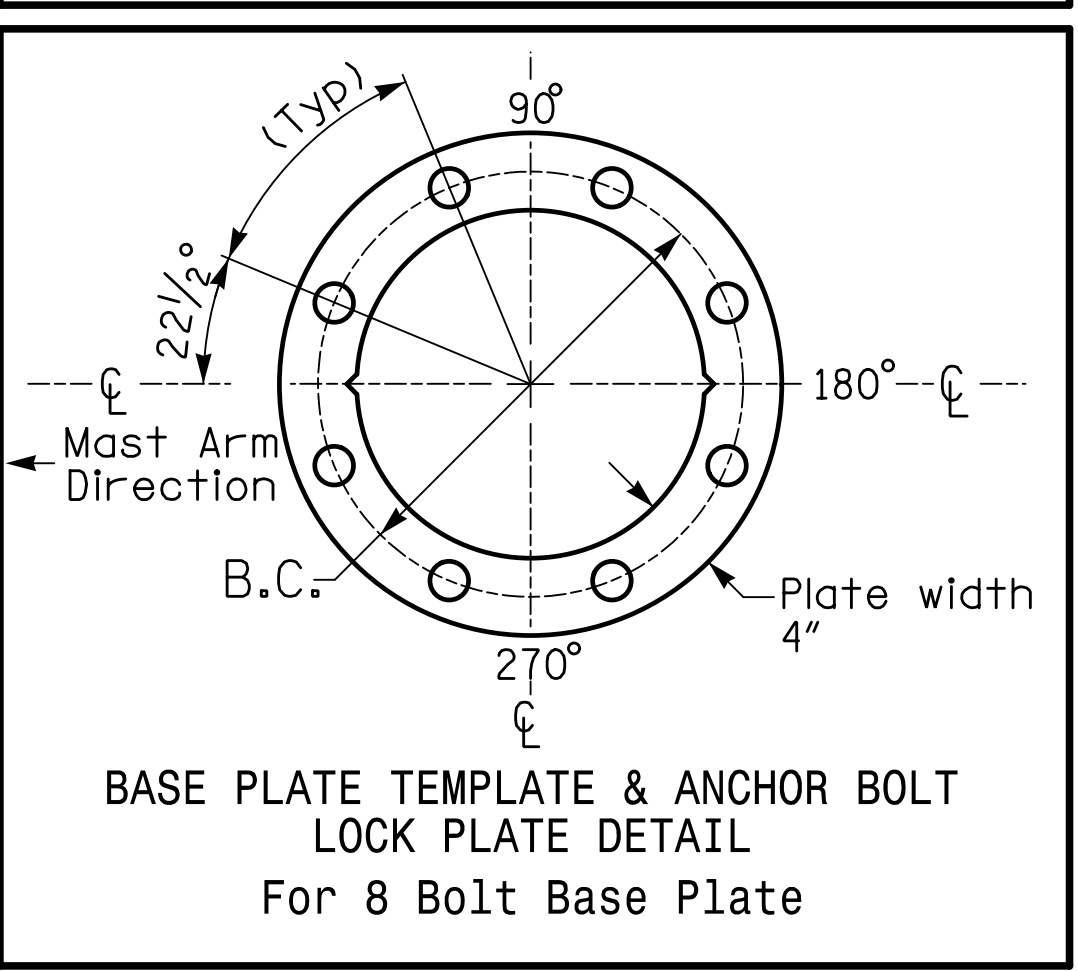
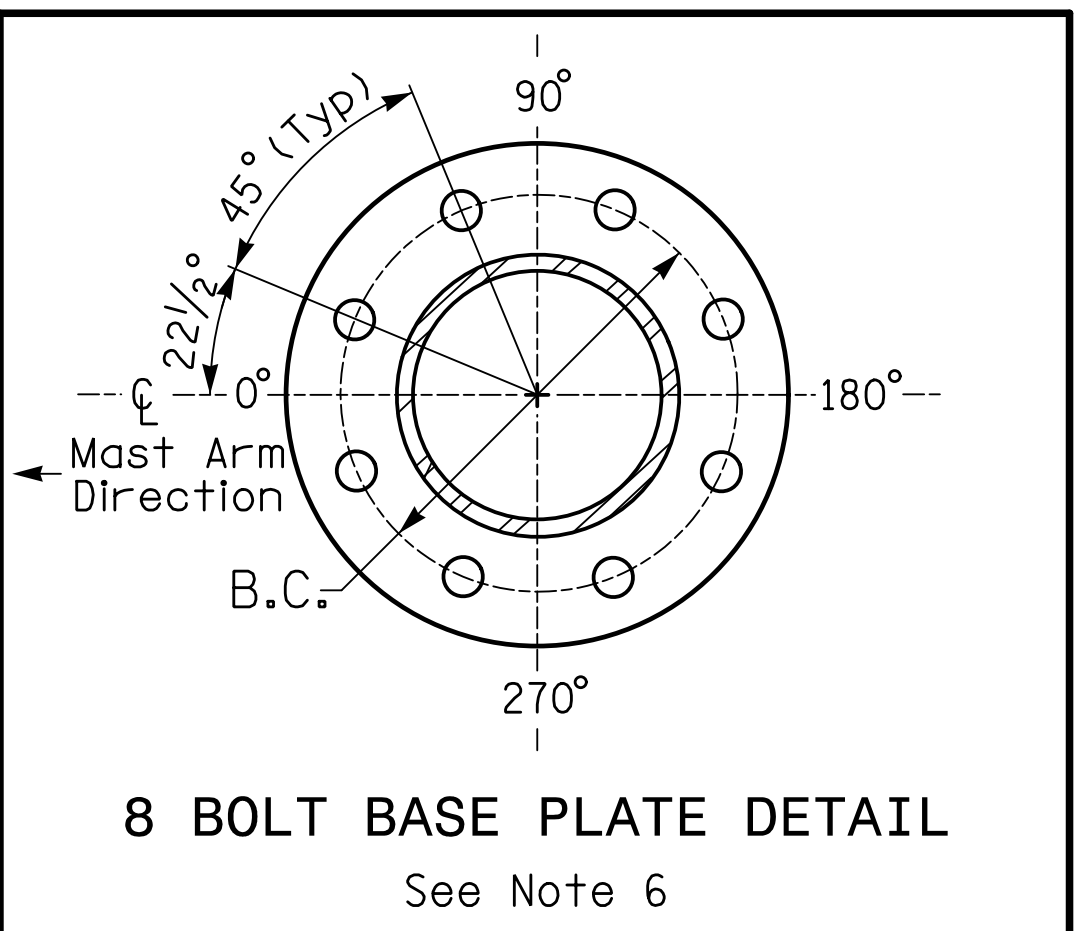
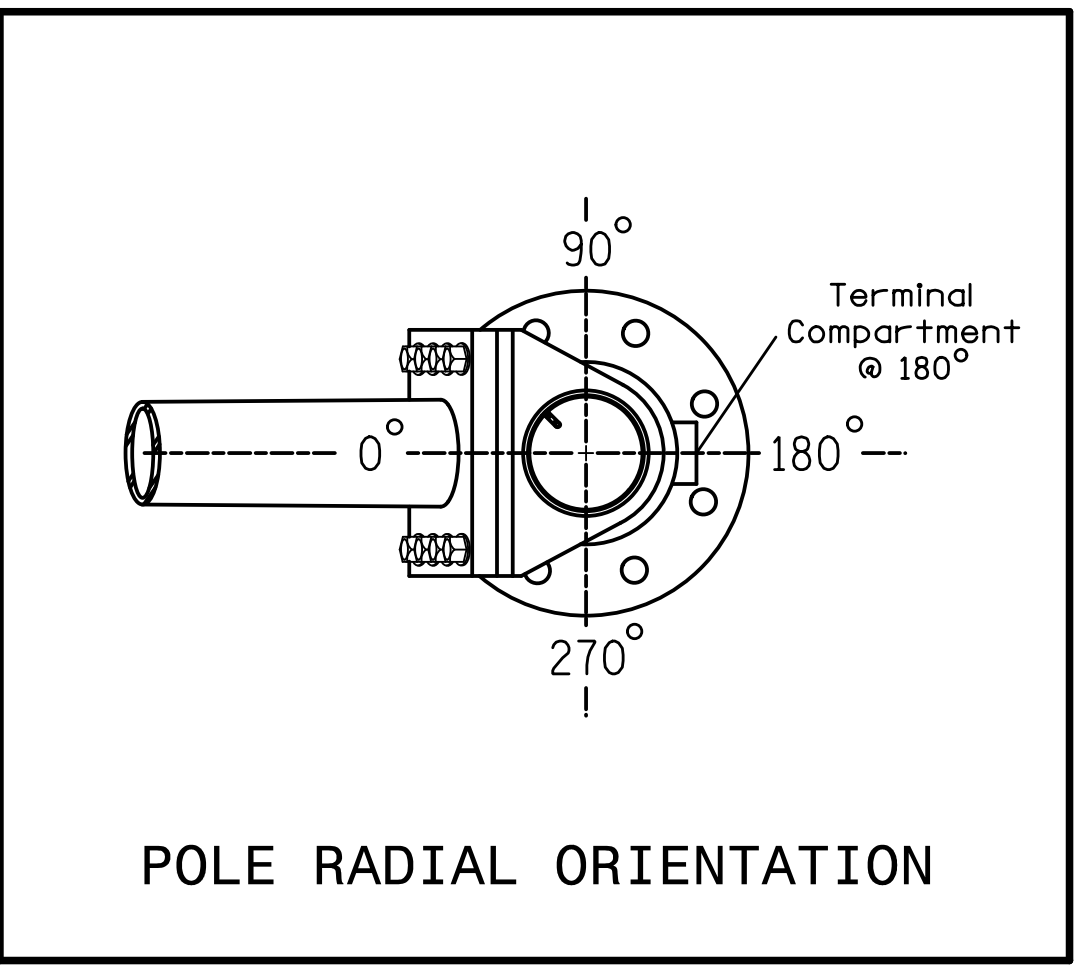


Elevation View

SPECIAL NOTE
The contractor is responsible for verifying that the mast arm attachment height (H1) will provide the "Design Height" clearance from the roadway before submitting final shop drawings for approval. Verify elevation data below which was obtained by field measurement or from available project survey data.

Elevation Data for Mast Arm Attachment (H1)

| Elevation Differences for: | Pole 1 | Pole 2 |
|--|-----------|-----------|
| Baseline reference point at ϕ Foundation @ ground level | 0.0 ft. | 0.0 ft. |
| Elevation difference at High point of roadway surface | +2.33 ft. | +0.15 ft. |
| Elevation difference at Edge of travelway or face of curb | +0.76 ft. | +0.62 ft. |



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Raleigh, North Carolina 27609
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METAL POLE No. 1 and 2

| | |
|-----------------------|-----------|
| PROJECT REFERENCE NO. | SHEET NO. |
| I-5000 | Sig. 6.2 |

| MAST ARM LOADING SCHEDULE | | | | |
|---------------------------|---|-----------|-------------------------|--------|
| LOADING SYMBOL | DESCRIPTION | AREA | SIZE | WEIGHT |
| | RIGID MOUNTED SIGNAL HEAD 12"-4 SECTION-WITH BACKPLATE | 11.5 S.F. | 25.5" W X 66.0" L | 74 LBS |
| | RIGID MOUNTED SIGNAL HEAD 12"-3 SECTION-WITH BACKPLATE | 9.3 S.F. | 25.5" W X 52.5" L | 60 LBS |
| | STREET NAME SIGN RIGID MOUNTED | 16.0 S.F. | 24.0" W X 96.0" L | 36 LBS |

NOTES

DESIGN REFERENCE MATERIAL

- Design the traffic signal structure and foundation in accordance with:
The 6th Edition 2013 AASHTO "Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals, including all of the latest interim revisions.
The 2012 NCDOT "Standard Specifications for Roads and Structures." The latest addenda to the specifications can be found in the traffic signal project special provisions.
The 2012 NCDOT Roadway Standard Drawings.
The traffic signal project plans and special provisions.
The NCDOT "Metal Pole Standards" located at the following NCDOT website:
<https://connect.ncdot.gov/resources/safety/Pages/ITS-Design-Resources.aspx>

DESIGN REQUIREMENTS

- Design the traffic signal structure using the loading conditions shown in the elevation views. These are anticipated worst case "design loads" and may not represent the actual loads that will be applied at the time of the installation. The contractor should refer to the traffic signal plans for the actual loads that will be applied at the time of the installation.
- Design all signal supports using stress ratios that do not exceed 0.9.
- The camber design for the mast arm deflection should provide an appearance of a low pitched arch where the tip or the free end of the mast arm does not deflect below horizontal when fully loaded.
- A clamp-type bolted mast arm-to-pole connection may be used instead of the welded ring stiffened box connection shown as long as the connection meets all of the design requirements.
- Design base plate with 8 anchor bolt holes. Provide 2 inch x 60 inch anchor bolts.
- The mast arm attachment height (H1) shown is based on the following design assumptions:
a. Mast arm slope and deflection are not considered in determining the arm attachment height as they are assumed to offset each other.
b. Signalheads are rigidly mounted and vertically centered on the mast arm.
c. The roadway clearance height for design is as shown in the elevation views.
d. The top of the pole base plate is 0.75 feet above the ground elevation.
e. Refer to the Elevation Data Chart for the elevation differences between the proposed foundation ground level and the high point of the roadway.
- The pole manufacturer will determine the total height (H2) of each pole using the greater of the following:
Mast arm attachment height (H1) plus 2 feet, or
H1 plus 1/2 of the total height of the mast arm attachment assembly plus 1 foot.
- If pole location adjustments are required, the contractor must gain approval from the Engineer as this may affect the mast arm lengths and arm attachment heights. The contractor may contact the Signal Design Section Senior Structural Engineer for assistance at (919) 773-2800.
- The contractor is responsible for verifying that the mast arm length shown will allow proper positioning of the signalheads over the roadway.
- The contractor is responsible for providing soil penetration testing data (SPT) to the pole manufacturer so site specific foundations can be designed.

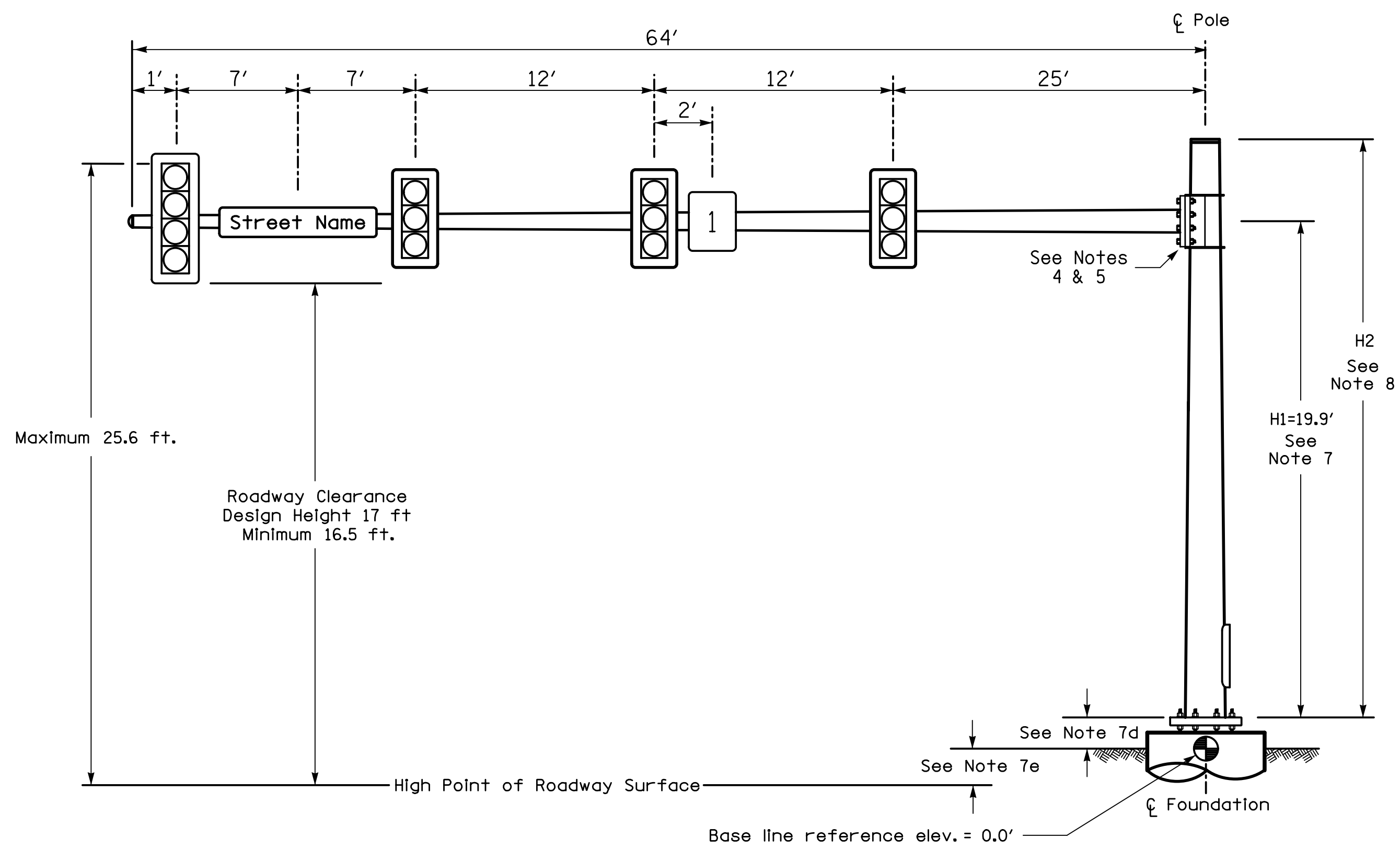
All metal poles and arms should be black in color as specified in the project special provisions.

NCDOT Wind Zone 4 (90 mph)

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

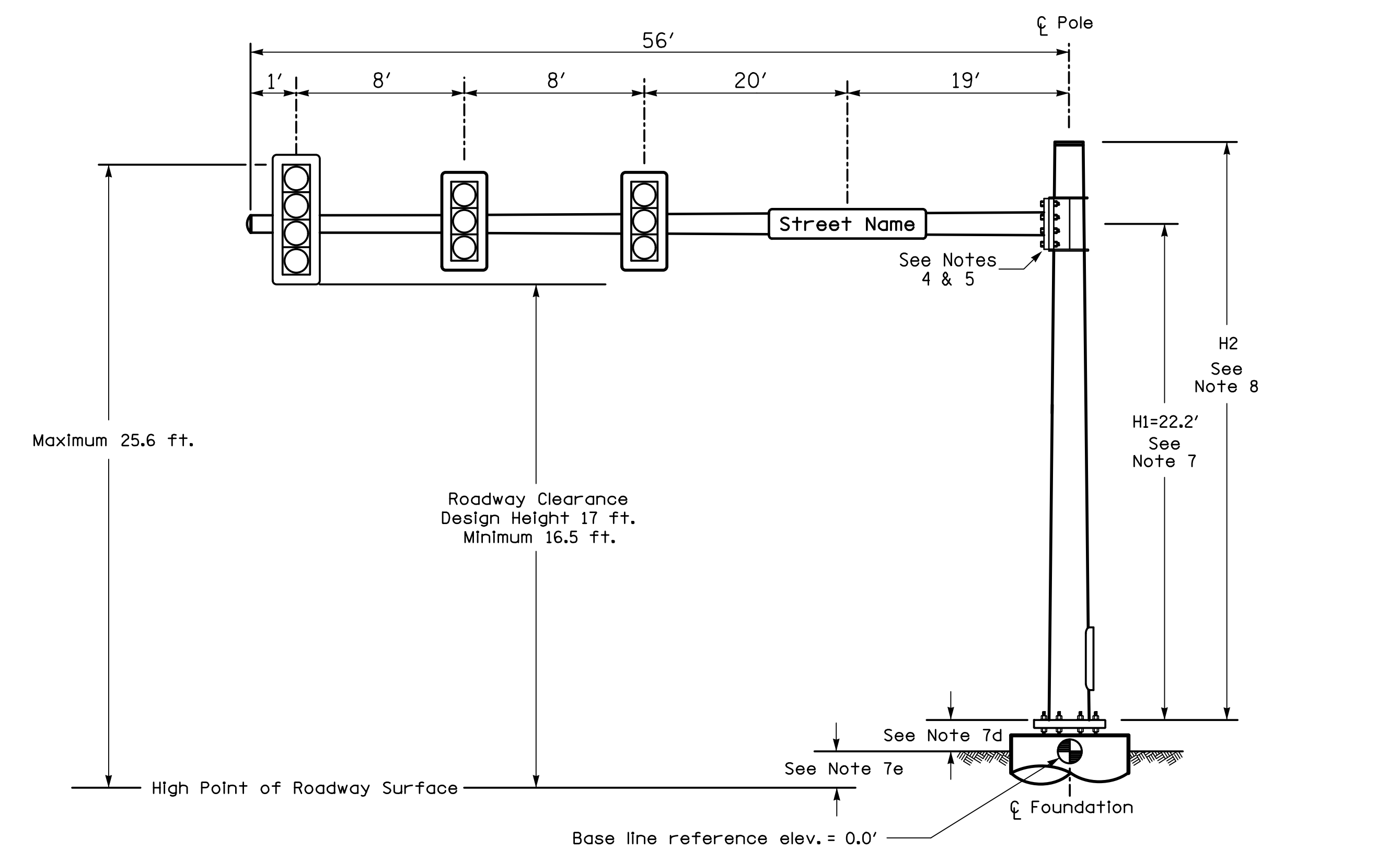
| | | | |
|--|---|--|--|
| | US 321 (N. Chester St.) at Bulb Avenue / Tulip Drive | | |
| | Division 12 Gaston Co. Gastonia PLAN DATE: September 2016 REVIEWED BY: A.D. Klinksiek PREPARED BY: T.R. Terrell REVIEWED BY: N.R. Simmons | SCALE: NONE REVISIONS: NONE INITI. DATE: | |

Design Loading for METAL POLE NO. 3



Elevation View

Design Loading for METAL POLE NO. 4



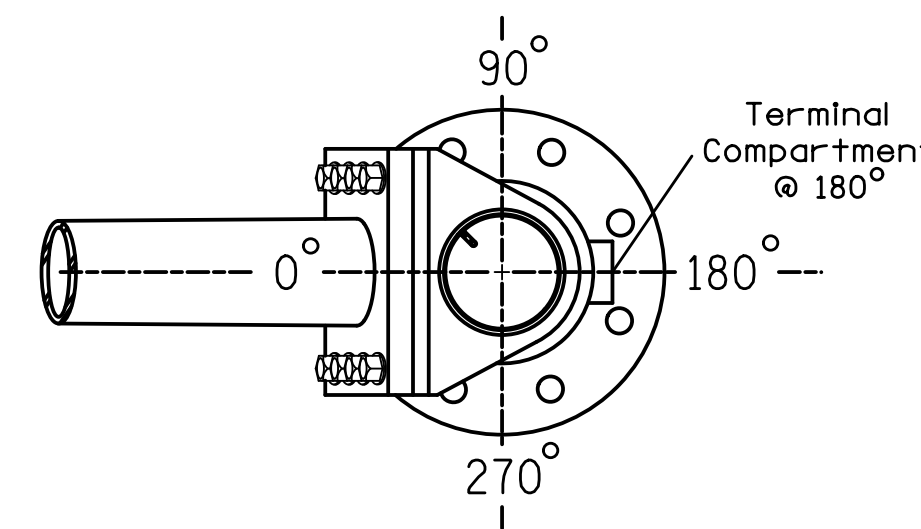
Elevation View

SPECIAL NOTE

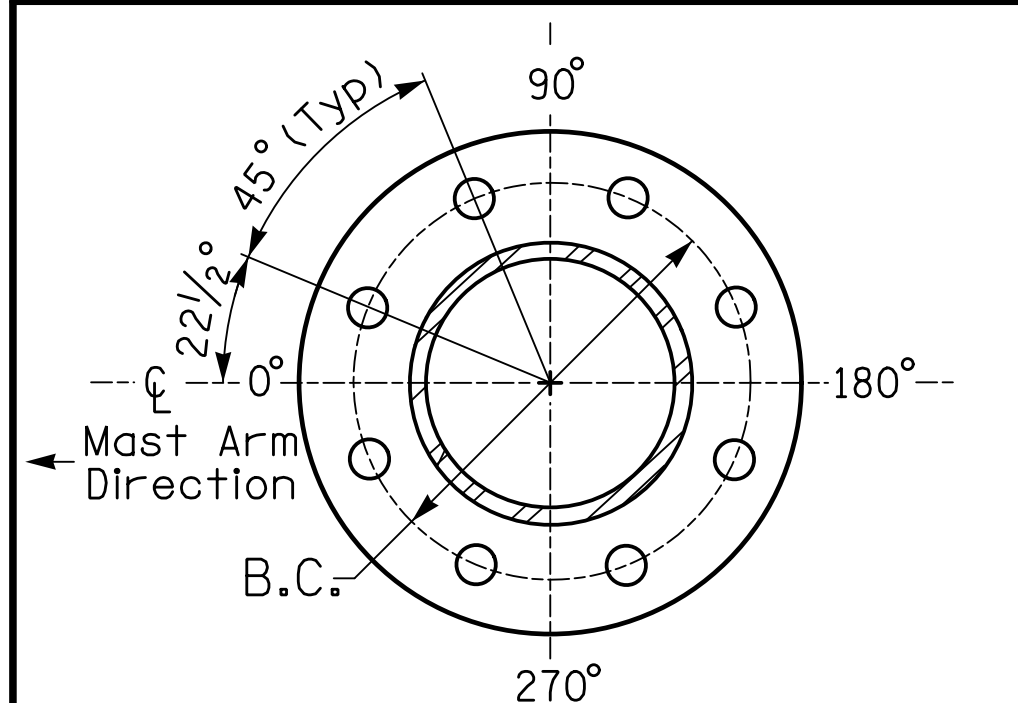
The contractor is responsible for verifying that the mast arm attachment height (H1) will provide the "Design Height" clearance from the roadway before submitting final shop drawings for approval. Verify elevation data below which was obtained by field measurement or from available project survey data.

Elevation Data for Mast Arm Attachment (H1)

| Elevation Differences for: | Pole 3 | Pole 4 |
|--|-----------|-----------|
| Baseline reference point at ϕ Foundation @ ground level | 0.0 ft. | 0.0 ft. |
| Elevation difference at High point of roadway surface | +0.92 ft. | +3.16 ft. |
| Elevation difference at Edge of travelway or face of curb | +0.20 ft. | +0.73 ft. |

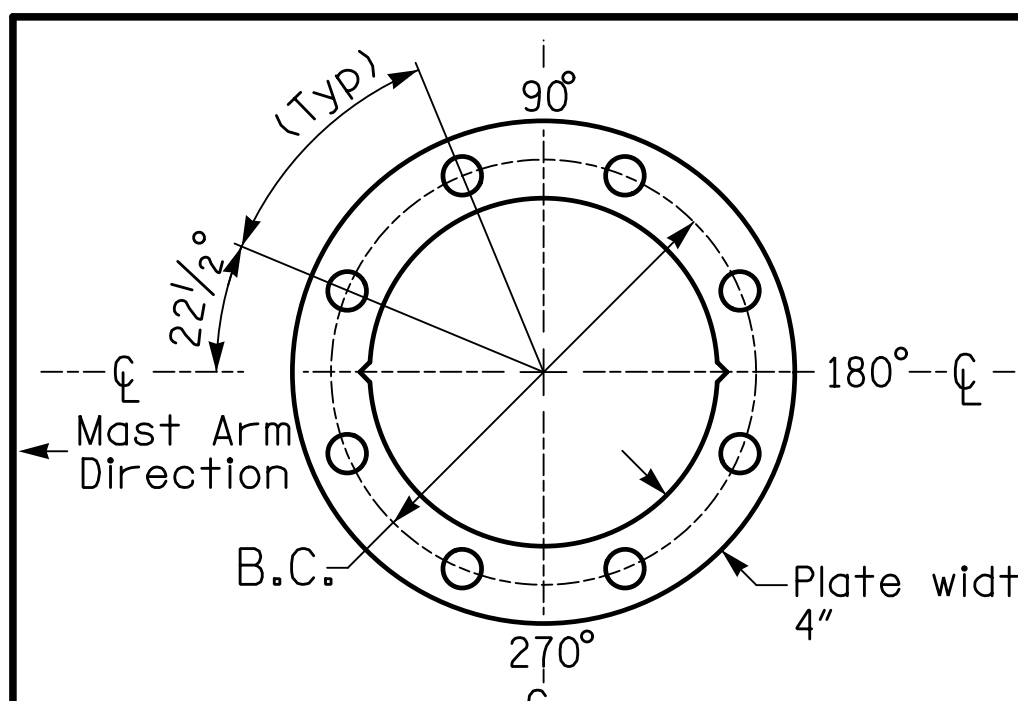


POLE RADIAL ORIENTATION



8 BOLT BASE PLATE DETAIL

See Note 6



BASE PLATE TEMPLATE & ANCHOR BOLT LOCK PLATE DETAIL For 8 Bolt Base Plate

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Raleigh, North Carolina 27609
NC License No: C-1554
(919) 546-8997

METAL POLE No. 3 and 4

| PROJECT REFERENCE NO. | SHEET NO. |
|-----------------------|-----------|
| I-5000 | Sig. 6.3 |

MAST ARM LOADING SCHEDULE

| LOADING SYMBOL | DESCRIPTION | AREA | SIZE | WEIGHT |
|----------------|---|-----------|-------------------------|--------|
| | RIGID MOUNTED SIGNAL HEAD 12"-4 SECTION-WITH BACKPLATE | 11.5 S.F. | 25.5" W X 66.0" L | 74 LBS |
| | RIGID MOUNTED SIGNAL HEAD 12"-3 SECTION-WITH BACKPLATE | 9.3 S.F. | 25.5" W X 52.5" L | 60 LBS |
| | SIGN RIGID MOUNTED | 5.0 S.F. | 24.0" W X 30.0" L | 11 LBS |
| | STREET NAME SIGN RIGID MOUNTED | 16.0 S.F. | 24.0" W X 96.0" L | 36 LBS |

NOTES

DESIGN REFERENCE MATERIAL

- Design the traffic signal structure and foundation in accordance with:
 - The 6th Edition 2013 AASHTO "Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals, including all of the latest interim revisions.
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DESIGN REQUIREMENTS

- Design the traffic signal structure using the loading conditions shown in the elevation views. These are anticipated worst case "design loads" and may not represent the actual loads that will be applied at the time of the installation. The contractor should refer to the traffic signal plans for the actual loads that will be applied at the time of the installation.
- Design all signal supports using stress ratios that do not exceed 0.9.
- The camber design for the mast arm deflection should provide an appearance of a low pitched arch where the tip or the free end of the mast arm does not deflect below horizontal when fully loaded.
- A clamp-type bolted mast arm-to-pole connection may be used instead of the welded ring stiffened box connection shown as long as the connection meets all of the design requirements.
- Design base plate with 8 anchor bolt holes. Provide 2 inch x 60 inch anchor bolts.
- The mast arm attachment height (H1) shown is based on the following design assumptions:
 - Mast arm slope and deflection are not considered in determining the arm attachment height as they are assumed to offset each other.
 - Signal heads are rigidly mounted and vertically centered on the mast arm.
 - The roadway clearance height for design is as shown in the elevation views.
 - The top of the pole base plate is 0.75 feet above the ground elevation.
 - Refer to the Elevation Data Chart for the elevation differences between the proposed foundation ground level and the high point of the roadway.
- The pole manufacturer will determine the total height (H2) of each pole using the greater of the following:
 - Mast arm attachment height (H1) plus 2 feet, or
 - H1 plus 1/2 of the total height of the mast arm attachment assembly plus 1 foot.
- If pole location adjustments are required, the contractor must gain approval from the Engineer as this may affect the mast arm lengths and arm attachment heights. The contractor may contact the Signal Design Section Senior Structural Engineer for assistance at (919) 773-2800.
- The contractor is responsible for verifying that the mast arm length shown will allow proper positioning of the signal heads over the roadway.
- The contractor is responsible for providing soil penetration testing data (SPT) to the pole manufacturer so site specific foundations can be designed.

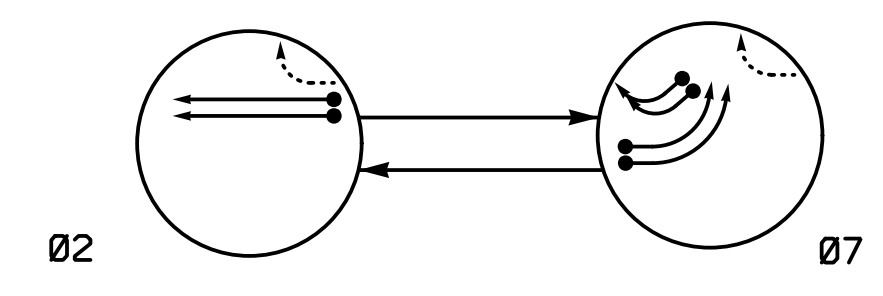
All metal poles and arms should be black in color as specified in the project special provisions.

NCDOT Wind Zone 4 (90 mph)

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

| | | | |
|-------------|--|---|--|
| | US 321 (N. Chester St.) at Bulb Avenue / Tulip Drive | | |
| | Division 12 Gaston Co. Gastonia | PLAN DATE: September 2016 REVIEWED BY: A.D. Klinksiek | |
| SCALE: NONE | REVISIONS: | INITI. DATE: | Documented by: <i>Natasha R. Simmons</i> 11/8/2016 SIGNATURE DATE SIG. INVENTORY NO. 12-0922 |

PHASING DIAGRAM



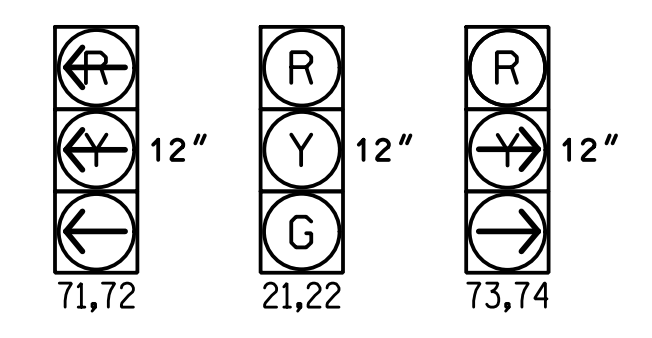
PHASING DIAGRAM DETECTION LEGEND

- ←● DETECTED MOVEMENT
- ← UNDETECTED MOVEMENT (OVERLAP)
- ←..... UNSIGNALIZED MOVEMENT
- ←- - - PEDESTRIAN MOVEMENT

| SIGNAL FACE | PHASE | | |
|-------------|-------|----|---------|
| | 02 | 07 | F LIGHT |
| 21,22 | G | R | Y |
| 71,72 | R | - | R |
| 73,74 | R | - | R |

SIGNAL FACE I.D.

All Heads L.E.D.

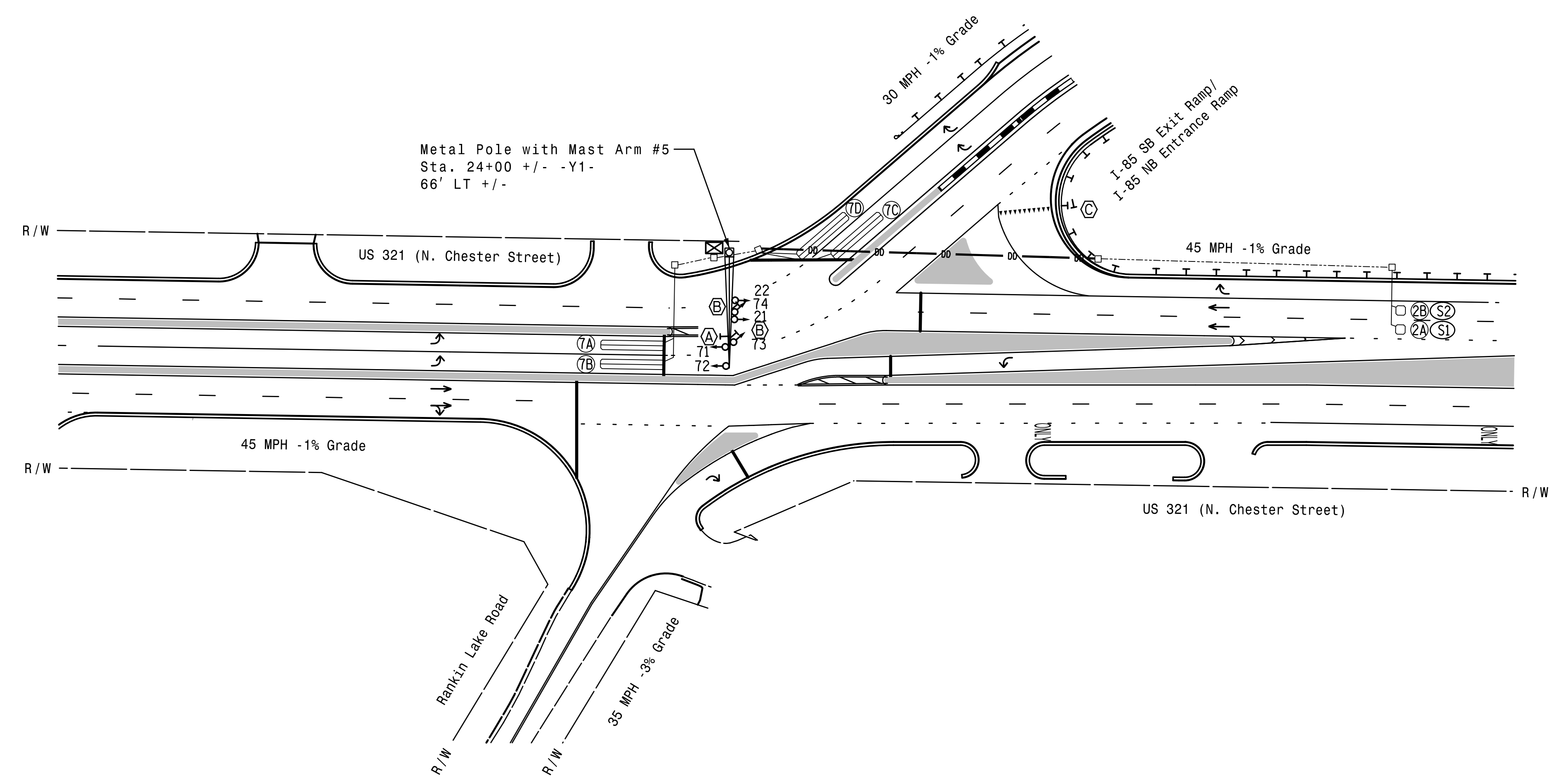


| OASIS 2070 LOOP & DETECTOR INSTALLATION CHART | | | | | | | | | | | | |
|---|-----------|----------------------------|-------|----------|----------------------|---------|-----------|-----------------|--------------|------------|-------------|----------|
| INDUCTIVE LOOPS | | | | | DETECTOR PROGRAMMING | | | | | | | |
| LOOP | SIZE (FT) | DISTANCE FROM STOPBAR (FT) | TURNS | NEW LOOP | PHASE | CALLING | EXTENSION | FULL TIME DELAY | STRETCH TIME | DELAY TIME | SYSTEM LOOP | NEW CARD |
| 2A/S1 | 6X6 | 300 | 5 | Y | 2 | Y | Y | - | - | - | Y | Y |
| 2B/S2 | 6X6 | 300 | 5 | Y | 2 | Y | Y | - | - | - | Y | Y |
| 7A | 6X40 | 0 | 2-4-2 | Y | 7 | Y | Y | - | - | - | - | Y |
| 7B | 6X40 | 0 | 2-4-2 | Y | 7 | Y | Y | - | - | - | - | Y |
| 7C | 6X40 | 0 | 2-4-2 | Y | 7 | Y | Y | - | - | 15 | - | Y |
| 7D | 6X40 | 0 | 2-4-2 | Y | 7 | Y | Y | - | - | 15 | - | Y |

2 Phase Fully Actuated (Gastonia City Signal System)

NOTES

- Refer to "Roadway Standard Drawings NCDOT" dated January 2012 and "Standard Specifications for Roads and Structures" dated January 2012.
- Do not program signal for late night flashing operation unless otherwise directed by the engineer.
- Set all detector units to presence mode.
- Locate new cabinet so as not to obstruct sight distance of vehicles turning right on red.
- Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.
- Signal System data: Controller Asset #1803



OASIS 2070 TIMING CHART

| FEATURE | PHASE | |
|-------------------------|------------|-----|
| | 2 | 7 |
| Min Green 1 * | 12 | 7 |
| Extension 1 * | 6.0 | 2.0 |
| Max Green 1 * | 90 | 25 |
| Yellow Clearance | 4.6 | 3.0 |
| Red Clearance | 1.6 | 3.9 |
| Red Revert | 2.0 | 2.0 |
| Walk 1 * | - | - |
| Don't Walk 1 | - | - |
| Seconds Per Actuation * | 1.5 | - |
| Max Variable Initial * | 34 | - |
| Time Before Reduction * | 15 | - |
| Time To Reduce * | 30 | - |
| Minimum Gap | 3.0 | - |
| Recall Mode | MIN RECALL | - |
| Vehicle Call Memory | YELLOW | - |
| Dual Entry | - | - |
| Simultaneous Gap | ON | ON |

* These values may be field adjusted. Do not adjust Min Green and Extension times for phase 2 lower than what is shown. Min Green for all other phases should not be lower than 4 seconds.

LEGEND

- | PROPOSED | EXISTING |
|--|--|
| ○→ Traffic Signal Head | ●→ N/A |
| ●→ Modified Signal Head | — Sign |
| ⊥ Pedestrian Signal Head | ⊥ Sign |
| ⊥ With Push Button & Sign | ⊥ Sign |
| ○ Signal Pole with Guy | ⊥ Signal Pole with Sidewalk Guy |
| ⊥ Inductive Loop Detector | ⊥ Inductive Loop Detector |
| ⊥ Controller & Cabinet | ⊥ Controller & Cabinet |
| ⊥ Junction Box | ⊥ Junction Box |
| ⊥ 2-in Underground Conduit | ⊥ 2-in Underground Conduit |
| N/A Right of Way | — Right of Way |
| → Directional Arrow | → Directional Arrow |
| ○ Metal Pole with Mastarm | ○ Metal Pole with Mastarm |
| N/A Guardrail | — Guardrail |
| — Directional Drill | N/A |
| Ⓐ "U-TURN YIELD TO RIGHT TURN" Sign (R10-16) | Ⓐ "U-TURN YIELD TO RIGHT TURN" Sign (R10-16) |
| Ⓑ Right Arrow "ONLY" Sign (R3-5R) | Ⓑ Right Arrow "ONLY" Sign (R3-5R) |
| Ⓒ "YIELD" Sign (R1-2) | Ⓒ "YIELD" Sign (R1-2) |

New Installation

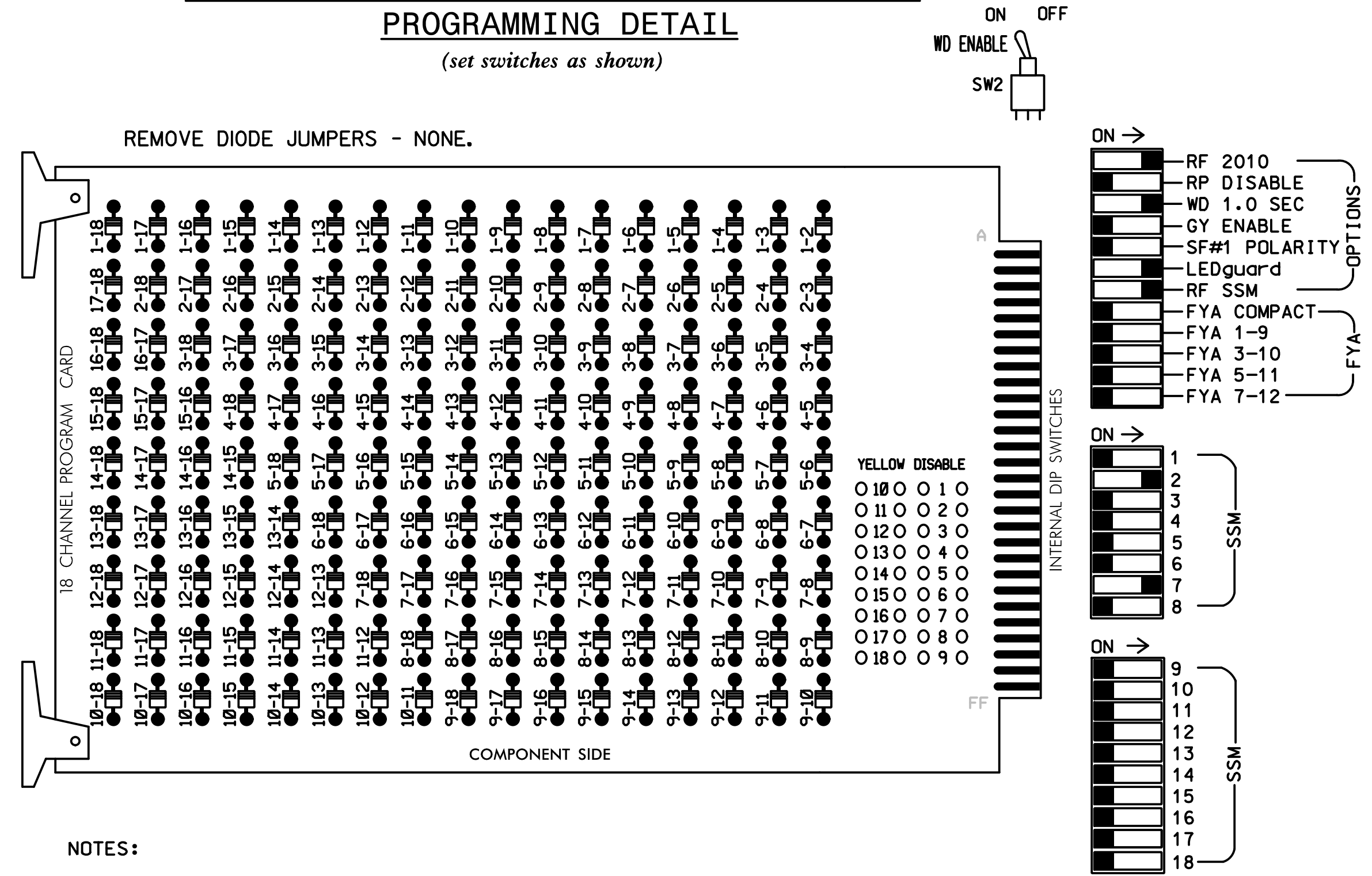
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

| | | | |
|--------------|--|---|--|
| | US 321 (N. Chester Street) at I-85 SB Exit Ramp/ I-85 NB Entrance Ramp | | |
| | Division 12 Gaston Co. Gastonia | PLAN DATE: September 2016 REVIEWED BY: T.R. Terrell | |
| SCALE 1"=50' | REVISIONS | INITI. DATE | Documented by: <i>Natasha R. Simmons</i> 11/8/2016 SIGNATURE DATE SIG. INVENTORY NO. 12-1803 |

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EDI MODEL 2018ECL-NC CONFLICT MONITOR PROGRAMMING DETAIL

(set switches as shown)



NOTES:

1. Card is provided with all diode jumpers in place. Removal of any jumper allows its channels to run concurrently.
2. Ensure jumpers SEL2-SEL5 and SEL9 are present on the monitor board.
3. Ensure that Red Enable is active at all times during normal operation.
4. Connect serial cable from conflict monitor to comm. port 1 of 2070 controller. Ensure conflict monitor communicates with 2070.

NOTES

1. To prevent "flash-conflict" problems, insert red flash program blocks for all unused vehicle load switches in the output file. The installer shall verify that signal heads flash in accordance with the Signal Plans.
2. Enable Simultaneous Gap-Out for all phases.
3. Program phase 2 for Variable Initial and Gap Reduction.
4. Program phase 2 for Start Up In Green.
5. Program phase 2 for Yellow Flash.
6. The cabinet and controller are part of the Gastonia City Signal System.

SIGNAL HEAD HOOK-UP CHART

| LOAD SWITCH NO. | S1 | S2 | S3 | S4 | S5 | S6 | S7 | S8 | S9 | S10 | S11 | S12 |
|-----------------|----|-------|-------|----|----|-------|----|----|-------|-------|-------|-------|
| CMU CHANNEL NO. | 1 | 2 | 13 | 3 | 4 | 14 | 5 | 6 | 15 | 7 | 8 | 16 |
| PHASE | 1 | 2 | 2 PED | 3 | 4 | 4 PED | 5 | 6 | 6 PED | 7 | 8 | 8 PED |
| SIGNAL HEAD NO. | NU | 21,22 | NU | NU | NU | NU | NU | NU | NU | 71,72 | 73,74 | NU |
| RED | | 128 | | | | | | | | | 122 | |
| YELLOW | | 129 | | | | | | | | | | |
| GREEN | | 130 | | | | | | | | | | |
| RED ARROW | | | | | | | | | | 122 | | |
| YELLOW ARROW | | | | | | | | | | 123 | 123 | |
| GREEN ARROW | | | | | | | | | | 124 | 124 | |
| Hand icon | | | | | | | | | | | | |
| Person icon | | | | | | | | | | | | |

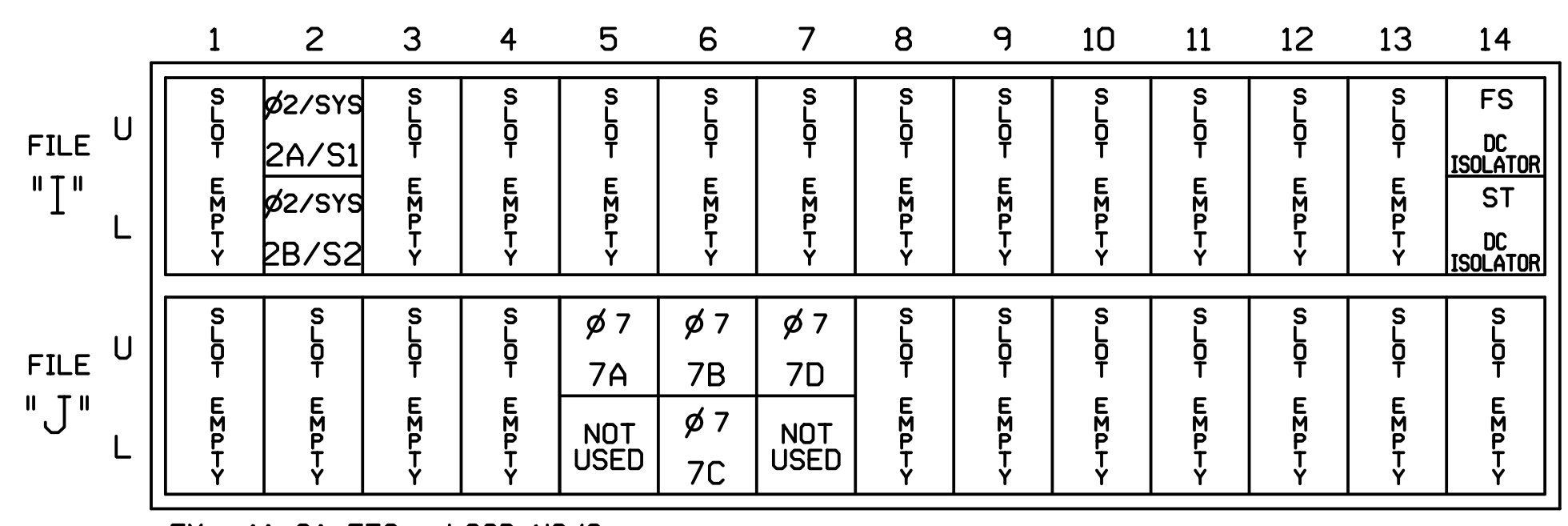
NU = Not Used

EQUIPMENT INFORMATION

CONTROLLER.....2070
 CABINET.....332
 SOFTWARE.....ECONOLITE OASIS
 CABINET MOUNT.....BASE
 OUTPUT FILE POSITIONS...12
 LOAD SWITCHES USED.....S2,S10
 PHASES USED.....2,7
 OVERLAPS.....NONE

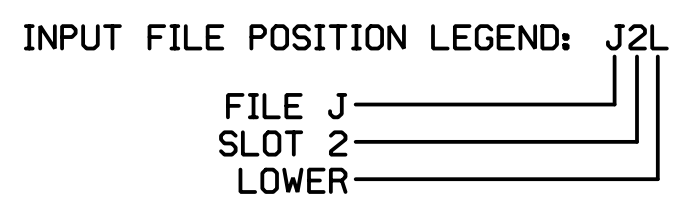
INPUT FILE POSITION LAYOUT

(front view)



INPUT FILE CONNECTION & PROGRAMMING CHART

| LOOP NO. | LOOP TERMINAL | INPUT FILE POS. | PIN NO. | INPUT ASSIGNMENT NO. | DETECTOR NO. | NEMA PHASE | CALL | EXTEND | FULL TIME DELAY | STRETCH TIME | DELAY TIME |
|----------|---------------|-----------------|---------|----------------------|--------------|------------|------|--------|-----------------|--------------|------------|
| 2A/S1 | TB2-5,6 | I2U | 39 | 1 | 2 | 2/SYS | Y | Y | | | |
| 2B/S2 | TB2-7,8 | I2L | 43 | 5 | 12 | 2/SYS | Y | Y | | | |
| 7A | TB5-5,6 | J5U | 57 | 19 | 7 | 7 | Y | Y | | | |
| 7B | TB5-9,10 | J6U | 42 | 4 | 8 | 7 | Y | Y | | | |
| 7C | TB5-11,12 | J6L | 46 | 8 | 18 | 7 | Y | Y | | | 15 |
| 7D | TB7-1,2 | J7U | 66 | 28 | 38 | 7 | Y | Y | | | 15 |



THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 12-1803
 DESIGNED: September 2016
 SEALED: 11-08-2016
 REVISED:

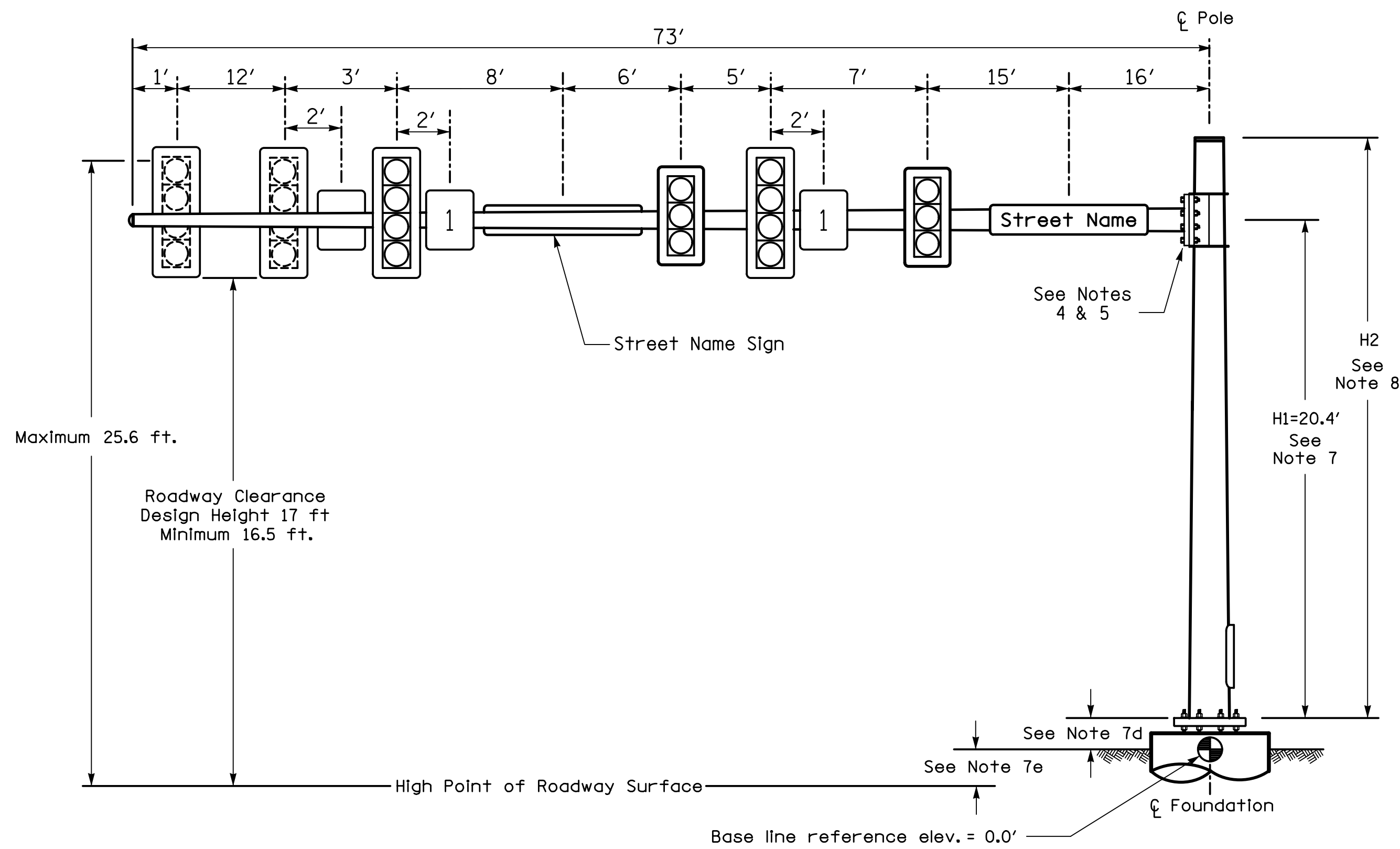
New Installation

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

| | | | |
|-----------|--|---|------|
| | US 321 (N. Chester Street) at I-85 SB Exit Ramp/ I-85 NB Entrance Ramp | | |
| | Division 12 Gaston Co. Gastonia | PLAN DATE: September 2016 REVIEWED BY: T.R. Terrell PREPARED BY: J.A. Wagner REVIEWED BY: N.R. Simmons | |
| REVISIONS | | INIT. | DATE |
| 11/8/2016 | | Signature: Natasha R. Simmons | |
| 11/8/2016 | | DATE | |
| 12-1803 | | SIG. INVENTORY NO. | |

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Design Loading for METAL POLE NO. 5



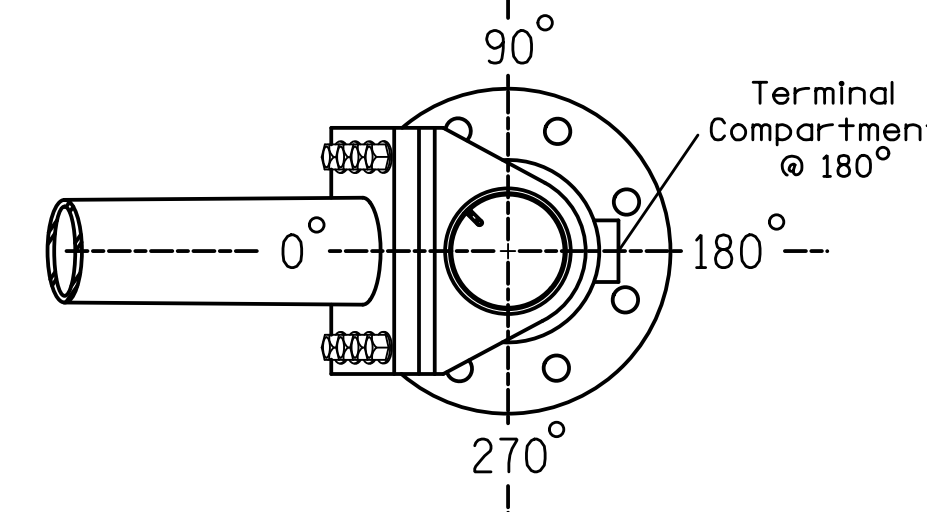
Elevation View

SPECIAL NOTE

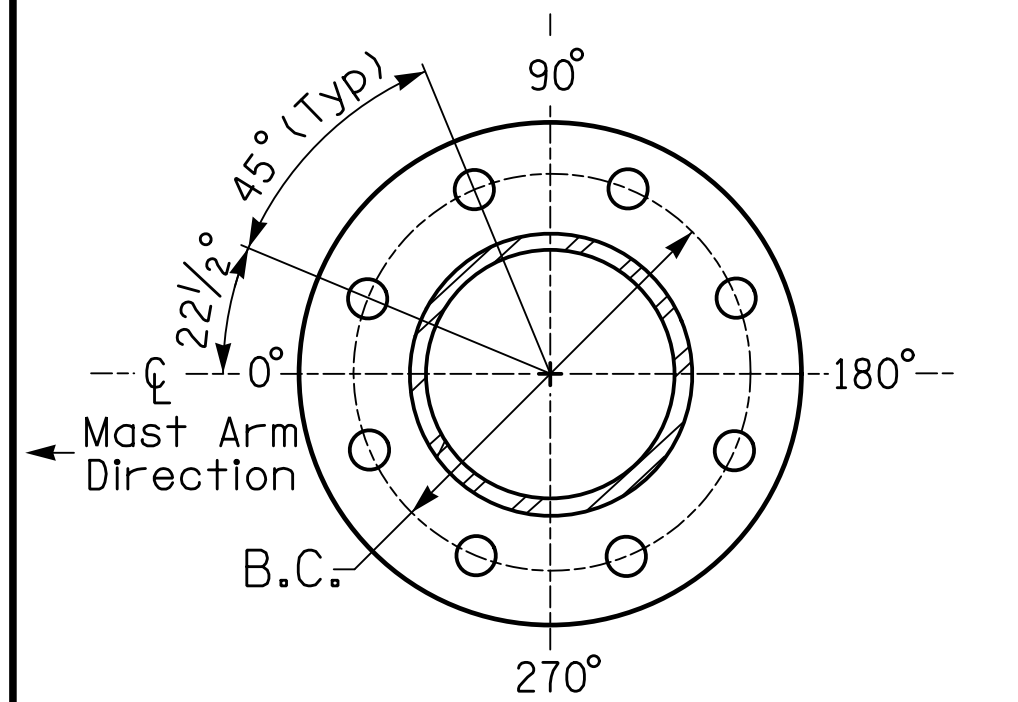
The contractor is responsible for verifying that the mast arm attachment height (H1) will provide the "Design Height" clearance from the roadway before submitting final shop drawings for approval. Verify elevation data below which was obtained by field measurement or from available project survey data.

Elevation Data for Mast Arm Attachment (H1)

| | | |
|--|-----------|--|
| Elevation Differences for: | Pole 5 | |
| Baseline reference point at ϕ Foundation @ ground level | 0.0 ft. | |
| Elevation difference at High point of roadway surface | +1.38 ft. | |
| Elevation difference at Edge of travelway or face of curb | +1.63 ft. | |

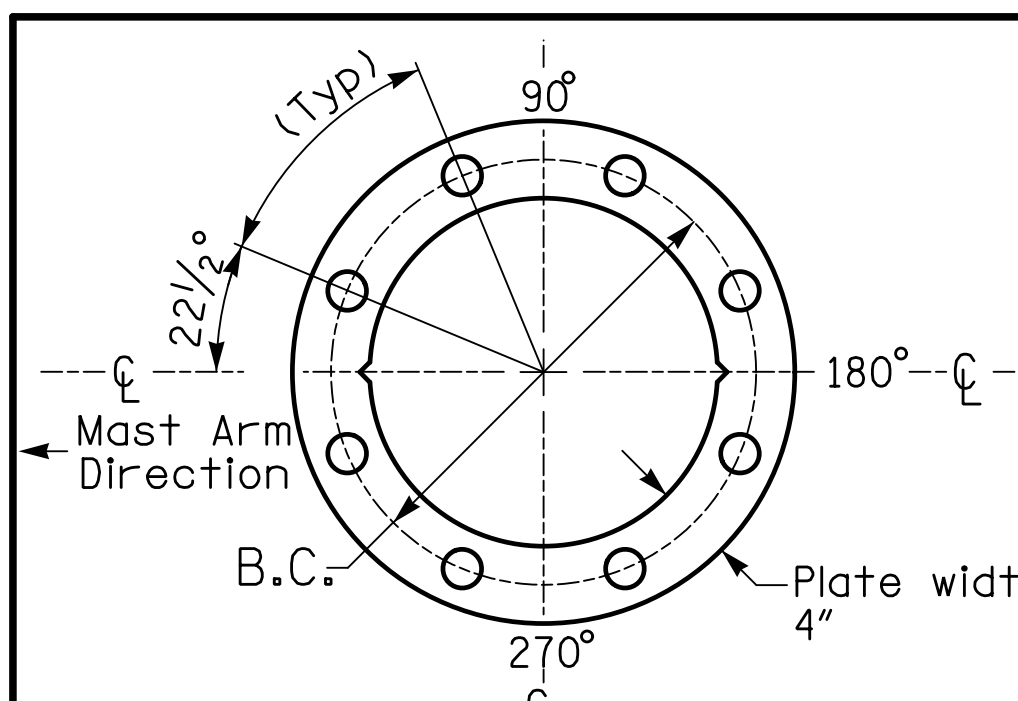


POLE RADIAL ORIENTATION



8 BOLT BASE PLATE DETAIL

See Note 6



BASE PLATE TEMPLATE & ANCHOR BOLT LOCK PLATE DETAIL For 8 Bolt Base Plate

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(919) 546-8997

METAL POLE No. 5

| | |
|-----------------------|-----------|
| PROJECT REFERENCE NO. | SHEET NO. |
| I-5000 | Sig. 7.2 |

MAST ARM LOADING SCHEDULE

| LOADING SYMBOL | DESCRIPTION | AREA | SIZE | WEIGHT |
|----------------|---|-----------|-------------------------|--------|
| | RIGID MOUNTED SIGNAL HEAD 12"-4 SECTION-WITH BACKPLATE | 11.5 S.F. | 25.5" W X 66.0" L | 74 LBS |
| | RIGID MOUNTED SIGNAL HEAD 12"-3 SECTION-WITH BACKPLATE | 9.3 S.F. | 25.5" W X 52.5" L | 60 LBS |
| | SIGN RIGID MOUNTED | 5.0 S.F. | 24.0" W X 30.0" L | 11 LBS |
| | STREET NAME SIGN RIGID MOUNTED | 12.0 S.F. | 18.0" W X 96.0" L | 27 LBS |

NOTES

DESIGN REFERENCE MATERIAL

- Design the traffic signal structure and foundation in accordance with:
 - The 6th Edition 2013 AASHTO "Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals, including all of the latest interim revisions.
 - The 2012 NCDOT "Standard Specifications for Roads and Structures." The latest addenda to the specifications can be found in the traffic signal project special provisions.
 - The 2012 NCDOT Roadway Standard Drawings.
 - The traffic signal project plans and special provisions.
 - The NCDOT "Metal Pole Standards" located at the following NCDOT website: <https://connect.ncdot.gov/resources/safety/Pages/ITS-Design-Resources.aspx>

DESIGN REQUIREMENTS

- Design the traffic signal structure using the loading conditions shown in the elevation views. These are anticipated worst case "design loads" and may not represent the actual loads that will be applied at the time of the installation. The contractor should refer to the traffic signal plans for the actual loads that will be applied at the time of the installation.
- Design all signal supports using stress ratios that do not exceed 0.9.
- The camber design for the mast arm deflection should provide an appearance of a low pitched arch where the tip or the free end of the mast arm does not deflect below horizontal when fully loaded.
- A clamp-type bolted mast arm-to-pole connection may be used instead of the welded ring stiffened box connection shown as long as the connection meets all of the design requirements.
- Design base plate with 8 anchor bolt holes. Provide 2 inch x 60 inch anchor bolts.
- The mast arm attachment height (H1) shown is based on the following design assumptions:
 - Mast arm slope and deflection are not considered in determining the arm attachment height as they are assumed to offset each other.
 - Signal heads are rigidly mounted and vertically centered on the mast arm.
 - The roadway clearance height for design is as shown in the elevation views.
 - The top of the pole base plate is 0.75 feet above the ground elevation.
 - Refer to the Elevation Data Chart for the elevation differences between the proposed foundation ground level and the high point of the roadway.
- The pole manufacturer will determine the total height (H2) of each pole using the greater of the following:
 - Mast arm attachment height (H1) plus 2 feet, or
 - H1 plus 1/2 of the total height of the mast arm attachment assembly plus 1 foot.
- If pole location adjustments are required, the contractor must gain approval from the Engineer as this may affect the mast arm lengths and arm attachment heights. The contractor may contact the Signal Design Section Senior Structural Engineer for assistance at (919) 773-2800.
- The contractor is responsible for verifying that the mast arm length shown will allow proper positioning of the signal heads over the roadway.
- The contractor is responsible for providing soil penetration testing data (SPT) to the pole manufacturer so site specific foundations can be designed.

All metal poles and arms should be black in color as specified in the project special provisions.

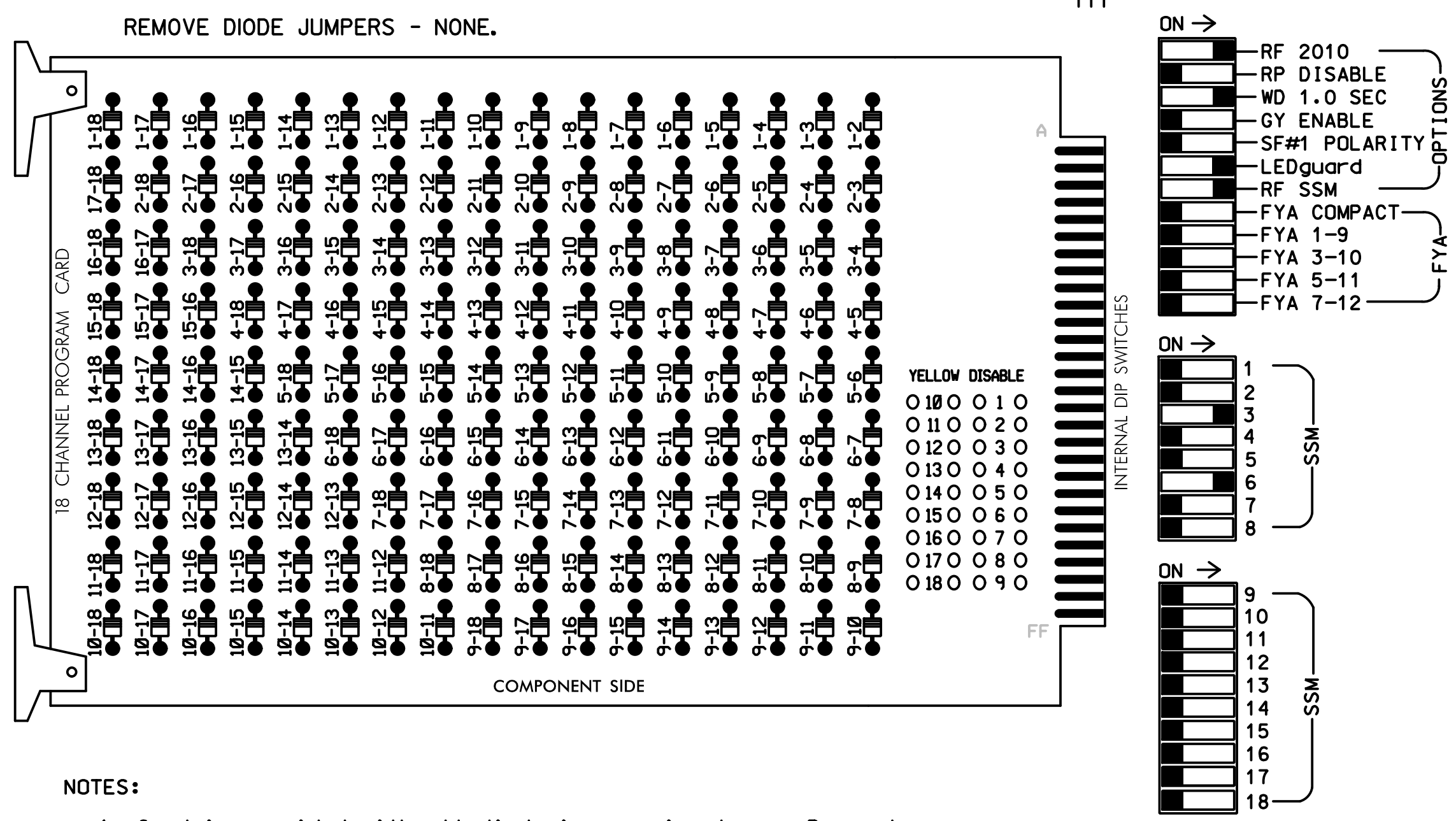
NCDOT Wind Zone 4 (90 mph)

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

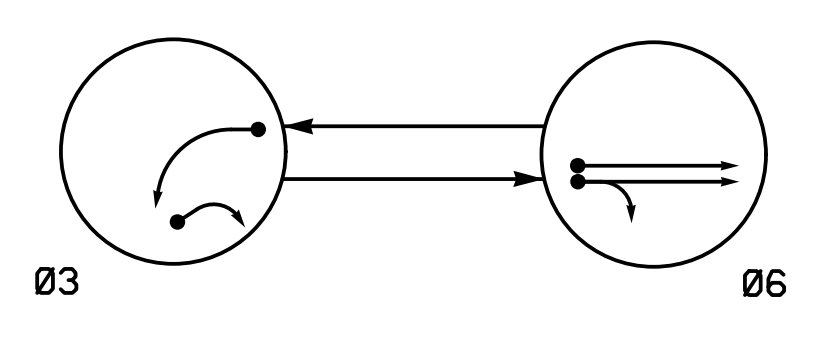
| | | |
|---|---|---|
| Prepared For TRANSPORTATION MOBILITY AND SAFETY DIVISION NORTH CAROLINA DEPARTMENT OF TRANSPORTATION SIGNAL DESIGN SECTION 750 N. Greenfield Pkwy, Garner, NC 27529 | US 321 (N. Chester Street) at I-85 SB Exit Ramp/ I-85 NB Entrance Ramp | SEAL NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 031464 NATASHA R. SIMMONS |
| | Division 12 Gaston Co. Gastonia PLAN DATE: September 2016 REVIEWED BY: A.D. Klinksiek PREPARED BY: T.R. Terrell REVIEWED BY: N.R. Simmons | |
| SCALE 0 N/A NONE | DocuSigned by: 11/8/2016 Natasha R. Simmons SIGNATURE DATE _____ | SIG. INVENTORY NO. 12-1803 |

EDI MODEL 2018ECL-NC CONFLICT MONITOR PROGRAMMING DETAIL

(set switches as shown)



PHASING DIAGRAM

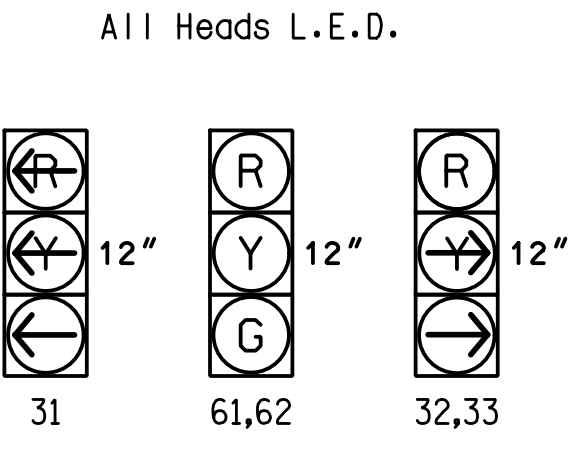


PHASING DIAGRAM DETECTION LEGEND

- ←● DETECTED MOVEMENT
- ← UNDETECTED MOVEMENT (OVERLAP)
- ←..... UNSIGNALIZED MOVEMENT
- ←- - - PEDESTRIAN MOVEMENT

| SIGNAL FACE | PHASE | | |
|-------------|-------|---|---|
| | S | 6 | F |
| 31 | --- | R | R |
| 32,33 | --- | R | R |
| 61,62 | R | G | Y |

SIGNAL FACE I.D.

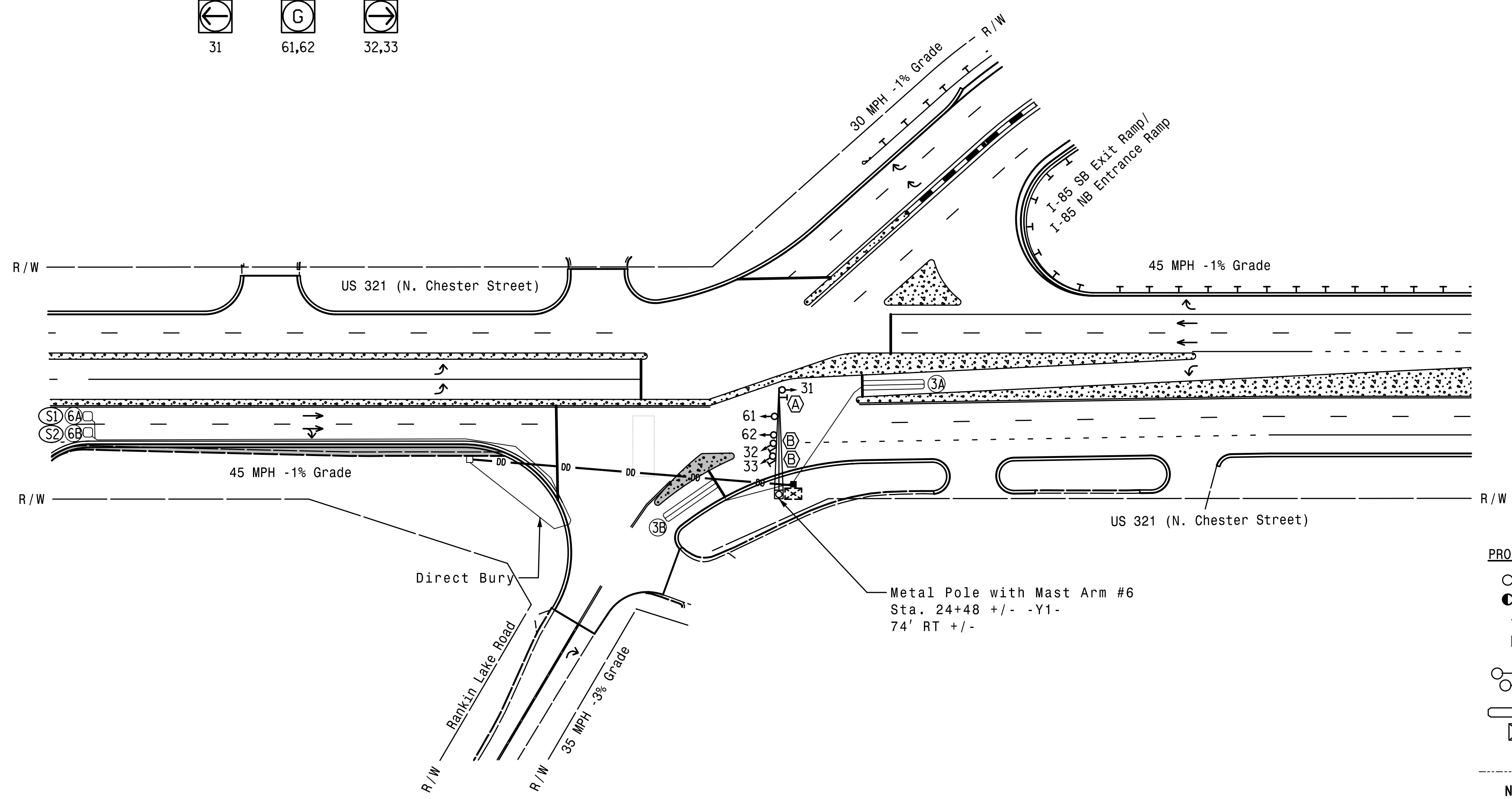


| OASIS 2070 LOOP & DETECTOR INSTALLATION CHART | | | | | | | | | | | | |
|---|-----------|----------------------------|-------|----------|----------------------|---------|-----------|-----------------|--------------|------------|-------------|----------|
| INDUCTIVE LOOPS | | | | | DETECTOR PROGRAMMING | | | | | | | |
| LOOP | SIZE (FT) | DISTANCE FROM STOPBAR (FT) | TURNS | NEW LOOP | PHASE | CALLING | EXTENSION | FULL TIME DELAY | STRETCH TIME | DELAY TIME | SYSTEM LOOP | NEW CARD |
| 3A | 6X40 | 0 | 2-4-2 | Y | 3 | Y | Y | - | - | - | - | - |
| 3B | 6X40 | 0 | 2-4-2 | Y | 3 | Y | Y | - | - | 20 | - | - |
| 6A/S1 | 6X6 | 300 | 5 | Y | 6 | Y | Y | - | - | - | Y | - |
| 6B/S2 | 6X6 | 300 | 5 | Y | 6 | Y | Y | - | - | - | Y | - |

2 Phase
Fully Actuated
(Gastonia City Signal System)

NOTES

1. Refer to "Roadway Standard Drawings NCDOT" dated January 2012 and "Standard Specifications for Roads and Structures" dated January 2012.
2. Do not program signal for late night flashing operation unless otherwise directed by the engineer.
3. Set all detector units to presence mode.
4. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.
5. Signal System data: Controller Asset #0921.



| OASIS 2070 TIMING CHART | | |
|-------------------------|-------|------------|
| FEATURE | PHASE | |
| | 3 | 6 |
| Min Green 1 * | 7 | 12 |
| Extension 1 * | 2.0 | 6.0 |
| Max Green 1 * | 25 | 90 |
| Yellow Clearance | 3.0 | 4.6 |
| Red Clearance | 3.3 | 3.0 |
| Red Revert | 2.0 | 2.0 |
| Walk 1 * | - | - |
| Don't Walk 1 | - | - |
| Seconds Per Actuation * | - | 1.5 |
| Max Variable Initial * | - | 34 |
| Time Before Reduction * | - | 15 |
| Time To Reduce * | - | 30 |
| Minimum Gap | - | 3.0 |
| Recall Mode | - | MIN RECALL |
| Vehicle Call Memory | - | YELLOW |
| Dual Entry | - | - |
| Simultaneous Gap | ON | ON |

| PROPOSED | | EXISTING |
|----------|--|----------|
| ○→ | Traffic Signal Head | ●→ |
| ●→ | Modified Signal Head | N/A |
| ⊥ | Sign | ⊥ |
| ⊥ | Pedestrian Signal Head With Push Button & Sign | ⊥ |
| ○→ | Signal Pole with Guy | ●→ |
| ○→ | Signal Pole with Sidewalk Guy | ●→ |
| ⊥ | Inductive Loop Detector | ⊥ |
| ⊥ | Controller & Cabinet | ⊥ |
| ⊥ | Junction Box | ⊥ |
| ⊥ | 2-in Underground Conduit | ⊥ |
| N/A | Right of Way | --- |
| N/A | Directional Arrow | → |
| N/A | Guardrail | ⊥ |
| ⊙ | "U-TURN YIELD TO RIGHT TURN" Sign (R10-16) | ⊙ |
| ⊙ | Right Arrow "ONLY" Sign (R3-5R) | ⊙ |
| ■ | Construction Zone | N/A |

* These values may be field adjusted. Do not adjust Min Green and Extension times for phase 6 lower than what is shown. Min Green for all other phases should not be lower than 4 seconds.

Temporary Signal
Phase 2, Step 1

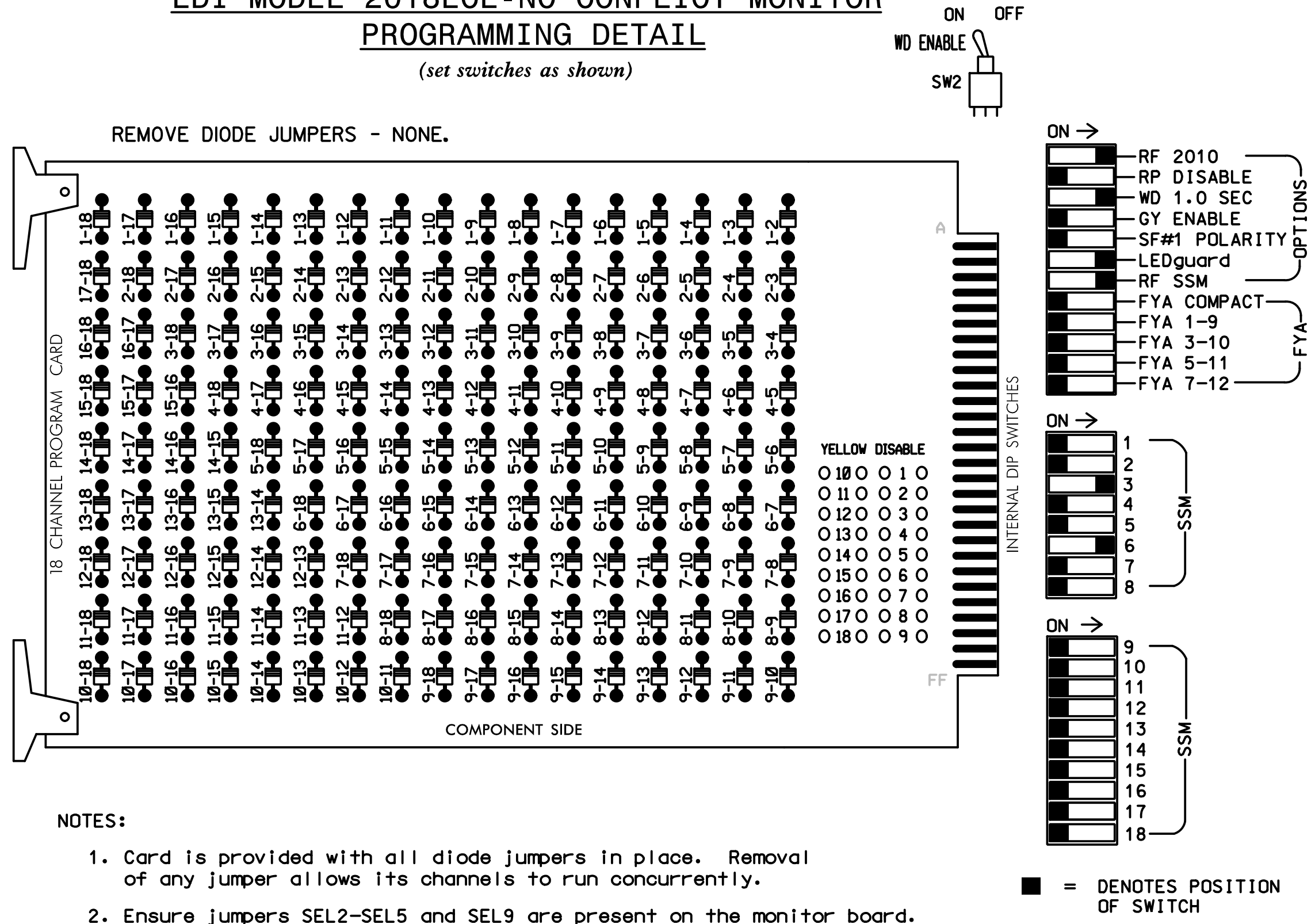
**DOCUMENT NOT CONSIDERED FINAL
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(919) 546-8997

| | | | |
|--------------------------|--|---------------------------------|------|
| | US 321 (N. Chester Street) at Rankin Lake Road | | |
| | Division 12 Gaston Co. Gastonia | PLAN DATE: September 2016 | |
| PREPARED BY: J.A. Wagner | REVIEWED BY: N.R. Simmons | REVISIONS | DATE |
| SCALE 0 50 1"=50' | 11/8/2016 | SIGNATURE Natasha R. Simmons | DATE |

EDI MODEL 2018ECL-NC CONFLICT MONITOR PROGRAMMING DETAIL

(set switches as shown)



- NOTES:
- Card is provided with all diode jumpers in place. Removal of any jumper allows its channels to run concurrently.
 - Ensure jumpers SEL2-SEL5 and SEL9 are present on the monitor board.
 - Ensure that Red Enable is active at all times during normal operation.
 - Connect serial cable from conflict monitor to comm. port 1 of 2070 controller. Ensure conflict monitor communicates with 2070.

NOTES

- To prevent "flash-conflict" problems, insert red flash program blocks for all unused vehicle load switches in the output file. The installer shall verify that signal heads flash in accordance with the Signal Plans.
- Enable Simultaneous Gap-Out for all phases.
- Program phase 6 for Variable Initial and Gap Reduction.
- Program phase 6 for Start Up In Green.
- Program phase 6 for Yellow Flash.
- The cabinet and controller are part of the Gastonia City Signal System.

SIGNAL HEAD HOOK-UP CHART

| LOAD SWITCH NO. | S1 | S2 | S3 | S4 | S5 | S6 | S7 | S8 | S9 | S10 | S11 | S12 |
|-----------------|----|----|-------|-----|-------|-------|----|-------|-------|-----|-----|-------|
| CMU CHANNEL NO. | 1 | 2 | 13 | 3 | 4 | 14 | 5 | 6 | 15 | 7 | 8 | 16 |
| PHASE | 1 | 2 | 2 PED | 3 | 4 | 4 PED | 5 | 6 | 6 PED | 7 | 8 | 8 PED |
| SIGNAL HEAD NO. | NU | NU | NU | 31 | 32,33 | NU | NU | 61,62 | NU | NU | NU | NU |
| RED | | | | 116 | | | | 134 | | | | |
| YELLOW | | | | | | | | 135 | | | | |
| GREEN | | | | | | | | 136 | | | | |
| RED ARROW | | | | 116 | | | | | | | | |
| YELLOW ARROW | | | | 117 | 117 | | | | | | | |
| GREEN ARROW | | | | 118 | 118 | | | | | | | |
| Hand icon | | | | | | | | | | | | |
| Person icon | | | | | | | | | | | | |

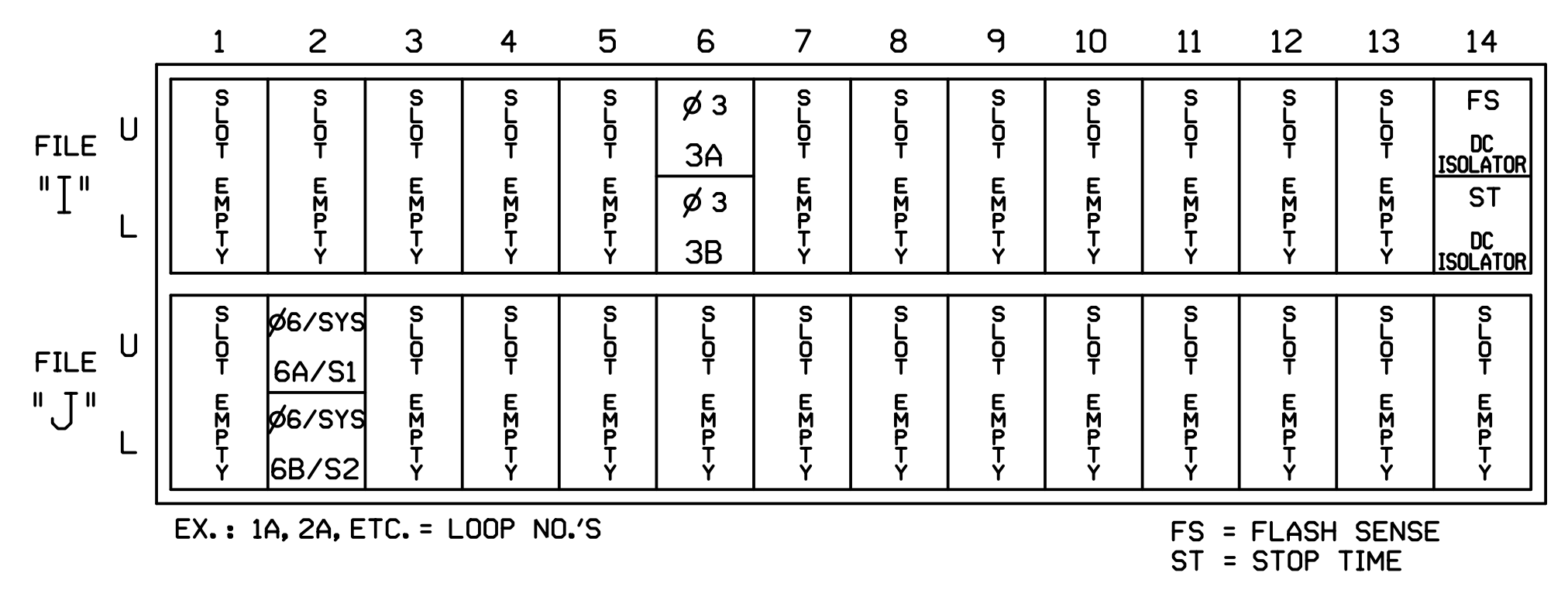
NU = Not Used

EQUIPMENT INFORMATION

CONTROLLER.....2070
 CABINET.....332
 SOFTWARE.....ECONOLITE OASIS
 CABINET MOUNT.....BASE
 OUTPUT FILE POSITIONS...12
 LOAD SWITCHES USED.....S4,S8
 PHASES USED.....3,6
 OVERLAPS.....NONE

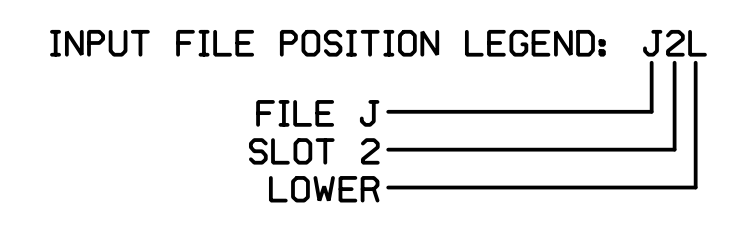
INPUT FILE POSITION LAYOUT

(front view)



INPUT FILE CONNECTION & PROGRAMMING CHART

| LOOP NO. | LOOP TERMINAL | INPUT FILE POS. | PIN NO. | INPUT ASSIGNMENT NO. | DETECTOR NO. | NEMA PHASE | CALL | EXTEND | FULL TIME DELAY | STRETCH TIME | DELAY TIME |
|----------|---------------|-----------------|---------|----------------------|--------------|------------|------|--------|-----------------|--------------|------------|
| 3A | TB4-9,10 | I6U | 41 | 3 | 4 | 3 | Y | Y | | | |
| 3B | TB4-11,12 | I6L | 45 | 7 | 14 | 3 | Y | Y | | | 20 |
| 6A/S1 | TB3-5,6 | J2U | 40 | 2 | 6 | 6/SYS | Y | Y | | | |
| 6B/S2 | TB3-7,8 | J2L | 44 | 6 | 16 | 6/SYS | Y | Y | | | |



THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 12-0921T2
 DESIGNED: September 2016
 SEALED: 11-08-2016
 REVISED:

Temporary Signal
Phase 2, Step 1

DOCUMENT NOT CONSIDERED FINAL
UNLESS ALL SIGNATURES COMPLETED

ELECTRICAL AND PROGRAMMING DETAILS FOR:

US 321 (N. Chester Street)
at
Rankin Lake Road

Division 12 Gaston Co. Gastonia

PLAN DATE: September 2016 REVIEWED BY: T.R. Terrell
 PREPARED BY: J.A. Wagner REVIEWED BY: N.R. Simmons

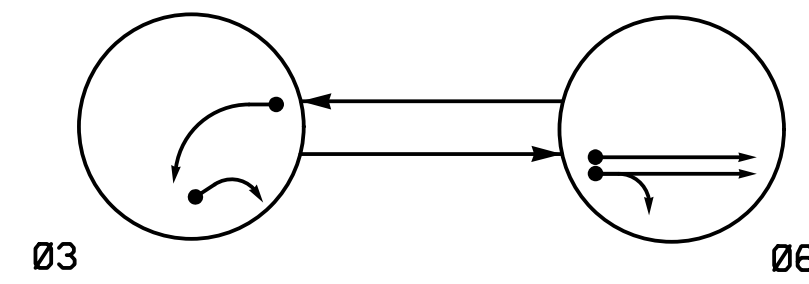
| REVISIONS | INIT. | DATE |
|-----------|-------|------|
| | | |

SEAL

DocuSign
 Signature: *Netasha R. Simmons* 11/8/2016
 DATE: _____
 SIGNATURE: _____
 DATE: _____
 SIG. INVENTORY NO. 12-0921T2

HNTB HNTB NORTH CAROLINA, P.C.
 343 E. Six Forks Road, Suite 200
 Raleigh, North Carolina 27609
 NC License No: C-1554
 (919) 546-8997

PHASING DIAGRAM



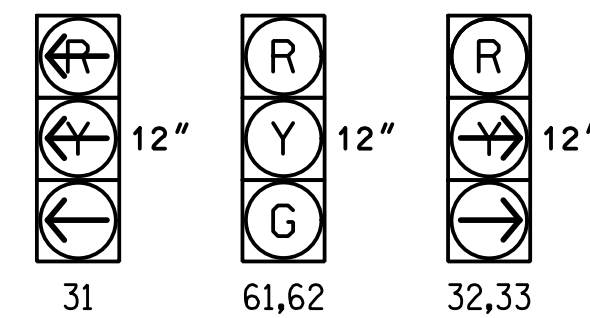
PHASING DIAGRAM DETECTION LEGEND

- ←●→ DETECTED MOVEMENT
- ←○→ UNDETECTED MOVEMENT (OVERLAP)
- ←...→ UNSIGNALIZED MOVEMENT
- ←---→ PEDESTRIAN MOVEMENT

| SIGNAL FACE | PHASE | | |
|-------------|-------|----|-------|
| | Ø3 | Ø6 | FLASH |
| 31 | --- | R | R |
| 32,33 | --- | R | R |
| 61,62 | R | G | Y |

SIGNAL FACE I.D.

All Heads L.E.D.

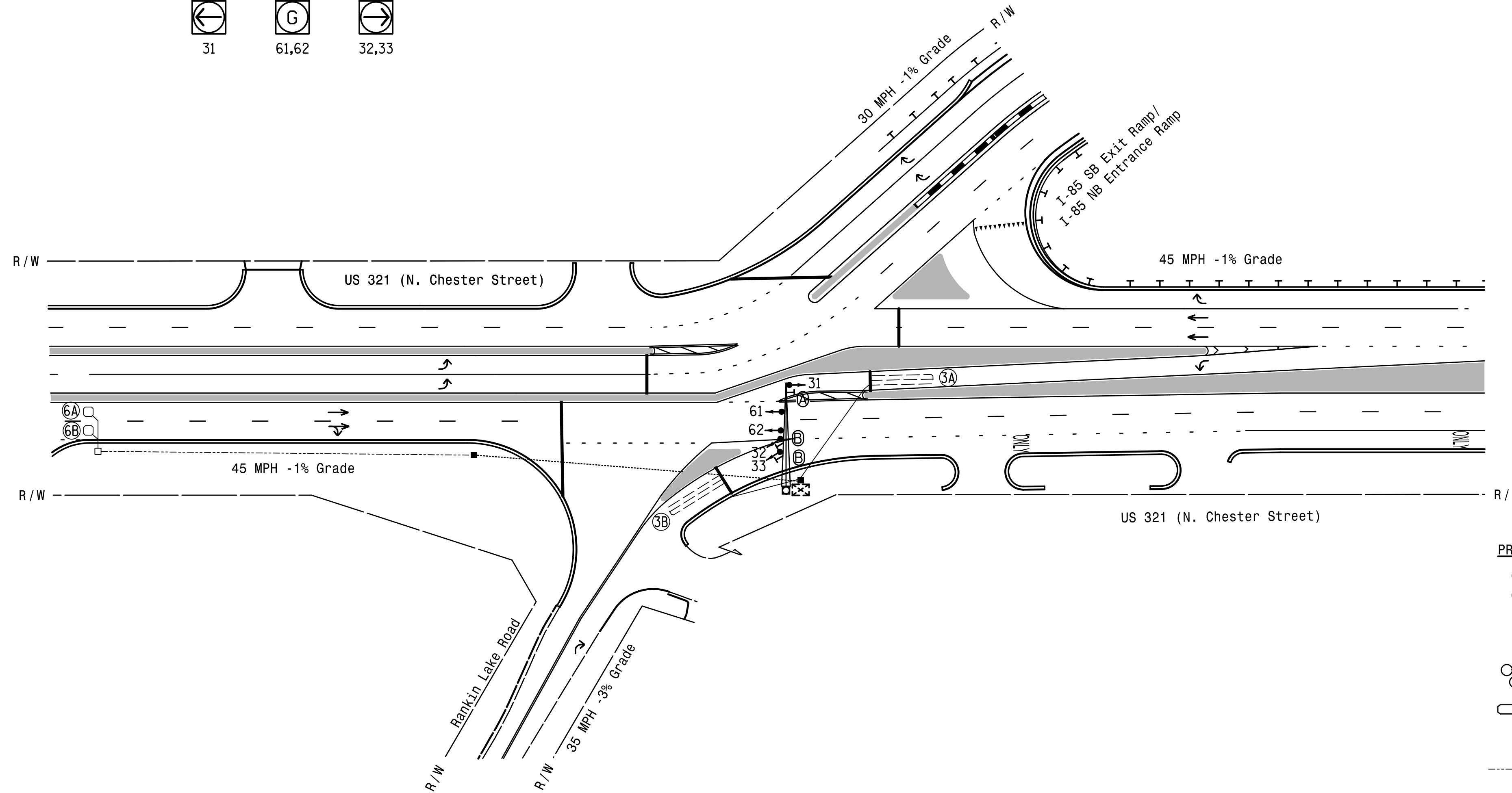


| OASIS 2070 LOOP & DETECTOR INSTALLATION CHART | | | | | | | | | | | |
|---|-----------|----------------------------|-------|----------|-------|----------------------|-----------|-----------------|--------------|------------|----------------------|
| INDUCTIVE LOOPS | | | | | | DETECTOR PROGRAMMING | | | | | |
| LOOP | SIZE (FT) | DISTANCE FROM STOPBAR (FT) | TURNS | NEW LOOP | PHASE | CALLING | EXTENSION | FULL TIME DELAY | STRETCH TIME | DELAY TIME | SYSTEM LOOP NEW CARD |
| 3A | 6X40 | 0 | 2-4-2 | - | 3 | Y | Y | - | - | - | - |
| 3B | 6X40 | 0 | 2-4-2 | - | 3 | Y | Y | - | - | 20 | - |
| 6A/S1 | 6X6 | 300 | 5 | Y | 6 | Y | Y | - | - | - | Y |
| 6B/S2 | 6X6 | 300 | 5 | Y | 6 | Y | Y | - | - | - | Y |

2 Phase Fully Actuated System (Gastonia City Signal System)

NOTES

- Refer to "Roadway Standard Drawings NCDOT" dated January 2012 and "Standard Specifications for Roads and Structures" dated January 2012.
- Do not program signal for late night flashing operation unless otherwise directed by the engineer.
- Set all detector units to presence mode.
- Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.
- Signal System data: Controller Asset #0921.



| OASIS 2070 TIMING CHART | | |
|-------------------------|-------|------------|
| FEATURE | PHASE | |
| | 3 | 6 |
| Min Green 1 * | 7 | 12 |
| Extension 1 * | 2.0 | 6.0 |
| Max Green 1 * | 25 | 90 |
| Yellow Clearance | 3.0 | 4.6 |
| Red Clearance | 3.3 | 3.0 |
| Red Revert | 2.0 | 2.0 |
| Walk 1 * | - | - |
| Don't Walk 1 | - | - |
| Seconds Per Actuation * | - | 1.5 |
| Max Variable Initial * | - | 34 |
| Time Before Reduction * | - | 15 |
| Time To Reduce * | - | 30 |
| Minimum Gap | - | 3.0 |
| Recall Mode | - | MIN RECALL |
| Vehicle Call Memory | - | YELLOW |
| Dual Entry | - | - |
| Simultaneous Gap | ON | ON |

* These values may be field adjusted. Do not adjust Min Green and Extension times for phase 6 lower than what is shown. Min Green for all other phases should not be lower than 4 seconds.

LEGEND

- | PROPOSED | EXISTING |
|--|--|
| ○→ Traffic Signal Head | ●→ Traffic Signal Head |
| ●→ Modified Signal Head | N/A |
| ⊥ Sign | ⊥ Sign |
| ⊥ Pedestrian Signal Head With Push Button & Sign | ⊥ Pedestrian Signal Head With Push Button & Sign |
| ⊥ Signal Pole with Guy | ⊥ Signal Pole with Guy |
| ⊥ Signal Pole with Sidewalk Guy | ⊥ Signal Pole with Sidewalk Guy |
| ⊥ Inductive Loop Detector | ⊥ Inductive Loop Detector |
| ⊥ Controller & Cabinet | ⊥ Controller & Cabinet |
| ⊥ Junction Box | ⊥ Junction Box |
| ⊥ 2-in Underground Conduit | ⊥ 2-in Underground Conduit |
| N/A Right of Way | --- Right of Way |
| → Directional Arrow | → Directional Arrow |
| --- Directional Drill | N/A |
| ⊥ Metal Pole with Mastarm | ⊥ Metal Pole with Mastarm |
| N/A Guardrail | ⊥ Guardrail |
| ⊥ "U-TURN YIELD TO RIGHT TURN" Sign (R10-16) | ⊥ "U-TURN YIELD TO RIGHT TURN" Sign (R10-16) |
| ⊥ Right Arrow "ONLY" Sign (R3-5R) | ⊥ Right Arrow "ONLY" Sign (R3-5R) |

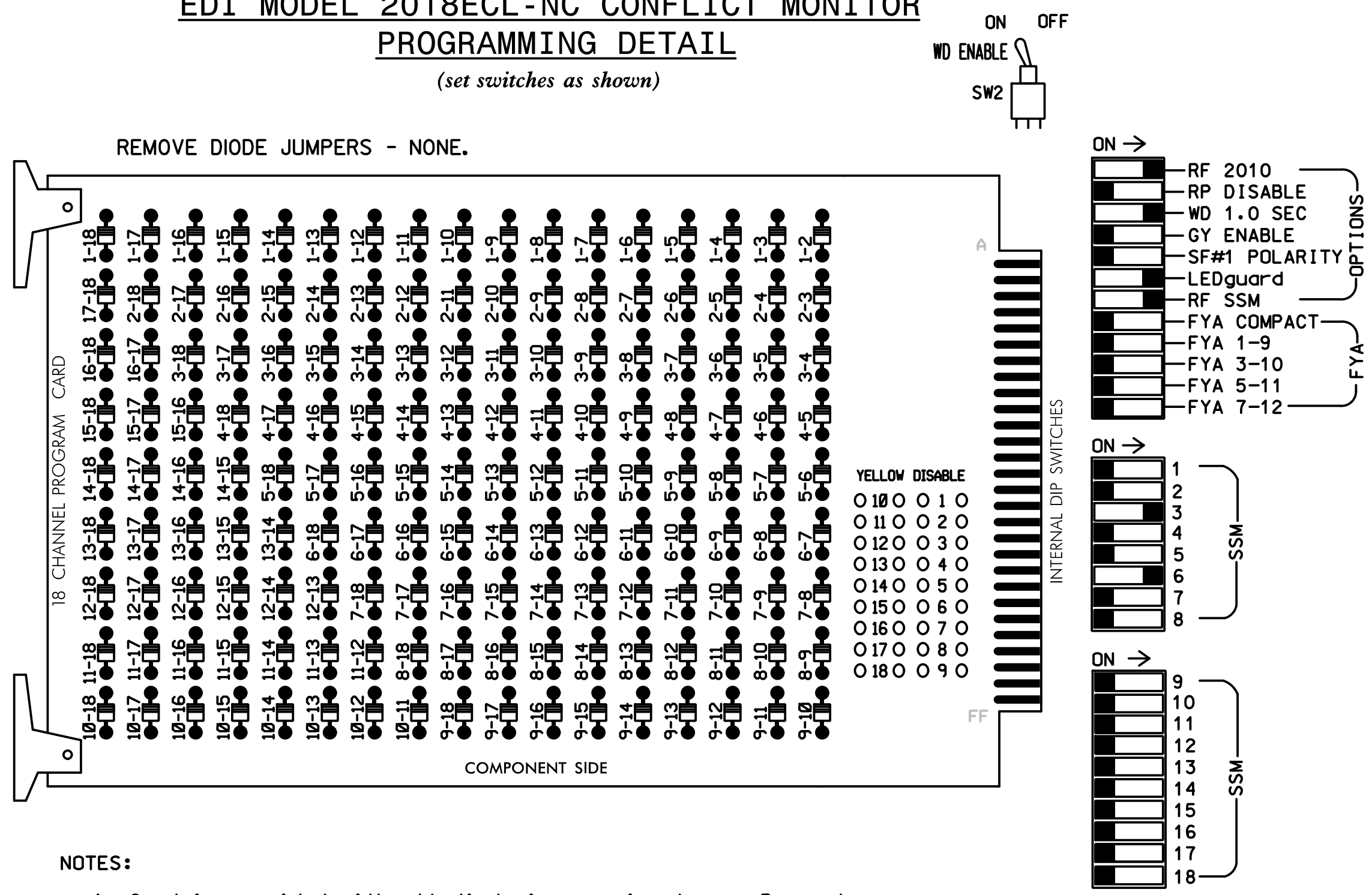
Signal Upgrade - Final Design

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

| | | | |
|---|--|-----------------------|---|
| | US 321 (N. Chester Street) at Rankin Lake Road | | |
| | Division 12 Gaston Co. Gastonia PLAN DATE: September 2016 REVIEWED BY: T.R. Terrell PREPARED BY: J.A. Wagner REVIEWED BY: N.R. Simmons | REVISIONS: INIT. DATE | |
| HNTB NORTH CAROLINA, P.C. 343 E. Six Forks Road, Suite 200 Raleigh, North Carolina 27609 NC License No: C-1554 (919) 546-8997 | | | 11/8/2016 Signature: <i>W. Tisha R. Simmons</i> Date: _____ Sig. Inventory No. 12-0921 |

EDI MODEL 2018ECL-NC CONFLICT MONITOR PROGRAMMING DETAIL

(set switches as shown)



NOTES:

1. Card is provided with all diode jumpers in place. Removal of any jumper allows its channels to run concurrently.
2. Ensure jumpers SEL2-SEL5 and SEL9 are present on the monitor board.
3. Ensure that Red Enable is active at all times during normal operation.
4. Connect serial cable from conflict monitor to comm. port 1 of 2070 controller. Ensure conflict monitor communicates with 2070.

■ = DENOTES POSITION OF SWITCH

NOTES

1. To prevent "flash-conflict" problems, insert red flash program blocks for all unused vehicle load switches in the output file. The installer shall verify that signal heads flash in accordance with the Signal Plans.
2. Enable Simultaneous Gap-Out for all phases.
3. Program phase 6 for Variable Initial and Gap Reduction.
4. Program phase 6 for Start Up In Green.
5. Program phase 6 for Yellow Flash.
6. The cabinet and controller are part of the Gastonia City Signal System.

EQUIPMENT INFORMATION

CONTROLLER.....2070
 CABINET.....332
 SOFTWARE.....ECONOLITE OASIS
 CABINET MOUNT.....BASE
 OUTPUT FILE POSITIONS...12
 LOAD SWITCHES USED.....S4,S8
 PHASES USED.....3,6
 OVERLAPS.....NONE

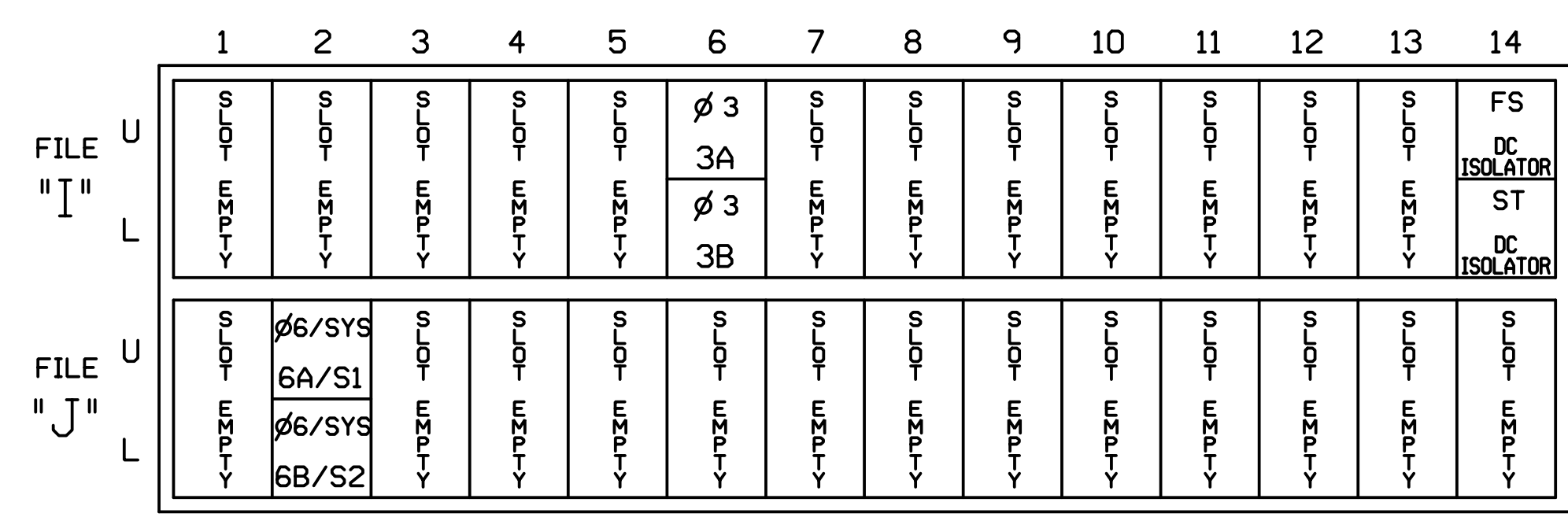
SIGNAL HEAD HOOK-UP CHART

| LOAD SWITCH NO. | S1 | S2 | S3 | S4 | S5 | S6 | S7 | S8 | S9 | S10 | S11 | S12 |
|---------------------|----|----|-------|-----|-------|-------|----|-------|-------|-----|-----|-------|
| CMU CHANNEL NO. | 1 | 2 | 13 | 3 | 4 | 14 | 5 | 6 | 15 | 7 | 8 | 16 |
| PHASE | 1 | 2 | 2 PED | 3 | 4 | 4 PED | 5 | 6 | 6 PED | 7 | 8 | 8 PED |
| SIGNAL HEAD NO. | NU | NU | NU | 31 | 32,33 | NU | NU | 61,62 | NU | NU | NU | NU |
| RED | | | | | 116 | | | 134 | | | | |
| YELLOW | | | | | | | | 135 | | | | |
| GREEN | | | | | | | | 136 | | | | |
| RED ARROW | | | | 116 | | | | | | | | |
| YELLOW ARROW | | | | 117 | 117 | | | | | | | |
| GREEN ARROW | | | | 118 | 118 | | | | | | | |
| Hand icon | | | | | | | | | | | | |
| Walking person icon | | | | | | | | | | | | |

NU = Not Used

INPUT FILE POSITION LAYOUT

(front view)



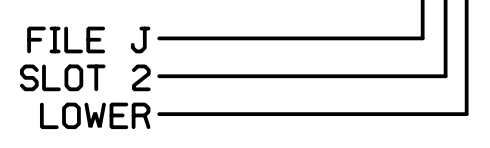
EX. : 1A, 2A, ETC. = LOOP NO.'S

FS = FLASH SENSE
 ST = STOP TIME

INPUT FILE CONNECTION & PROGRAMMING CHART

| LOOP NO. | LOOP TERMINAL | INPUT FILE POS. | PIN NO. | INPUT ASSIGNMENT NO. | DETECTOR NO. | NEMA PHASE | CALL | EXTEND | FULL TIME DELAY | STRETCH TIME | DELAY TIME |
|----------|---------------|-----------------|---------|----------------------|--------------|------------|------|--------|-----------------|--------------|------------|
| 3A | TB4-9,10 | I6U | 41 | 3 | 4 | 3 | Y | Y | | | |
| 3B | TB4-11,12 | I6L | 45 | 7 | 14 | 3 | Y | Y | | | 20 |
| 6A/S1 | TB3-5,6 | J2U | 40 | 2 | 6 | 6/SYS | Y | Y | | | |
| 6B/S2 | TB3-7,8 | J2L | 44 | 6 | 16 | 6/SYS | Y | Y | | | |

INPUT FILE POSITION LEGEND: J2L



THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 12-0921
 DESIGNED: September 2016
 SEALED: 11-08-2016
 REVISED:

Signal Upgrade - Final Design

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

Prepared for: **HNTB** NORTH CAROLINA, P.C.
 343 E. Six Forks Road, Suite 200
 Raleigh, North Carolina 27609
 NC License No: C-1554
 (919) 546-8997

US 321 (N. Chester Street) at Rankin Lake Road
 Division 12 Gaston Co. Gastonia

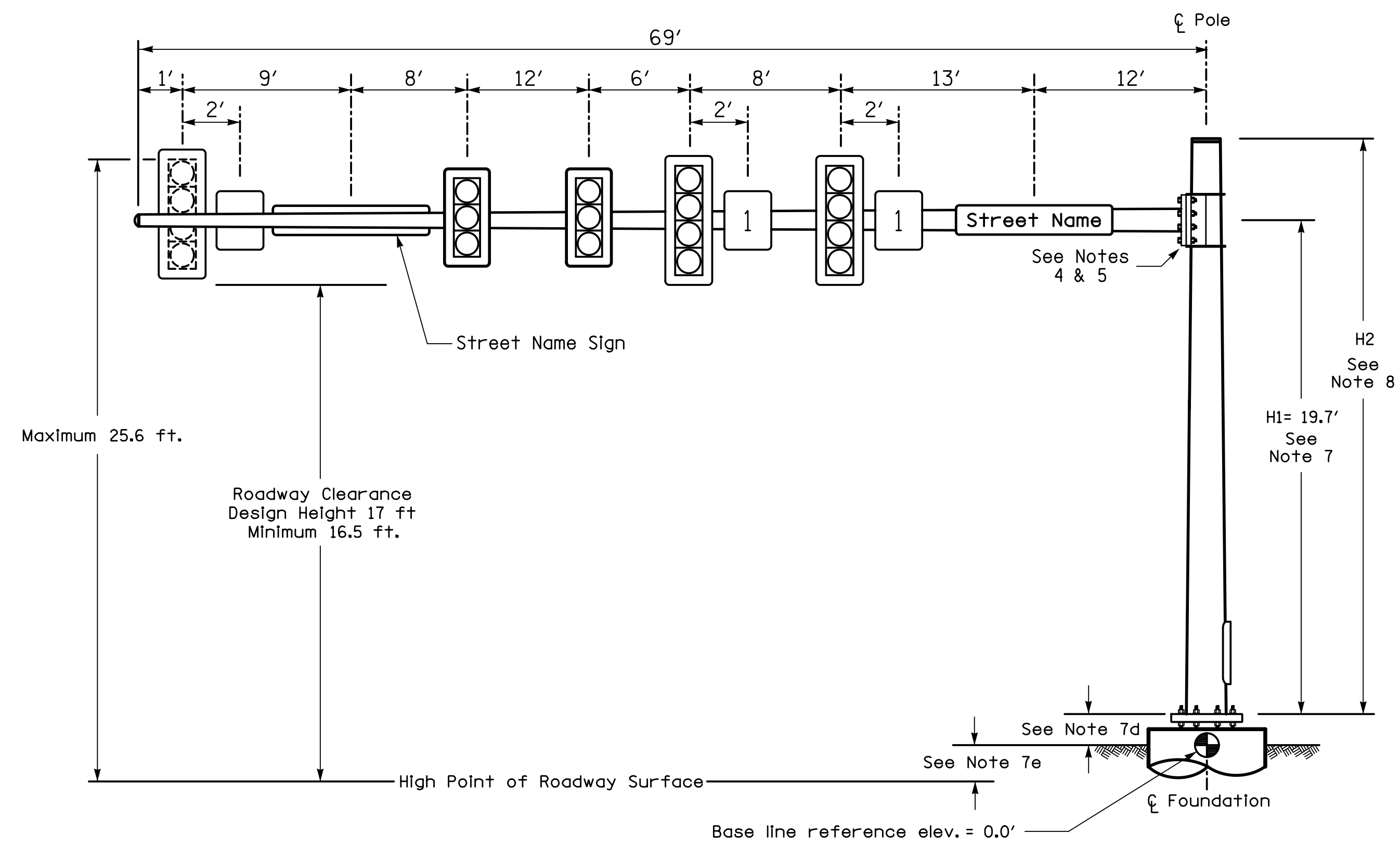
PLAN DATE: September 2016 REVIEWED BY: T.R. Terrell
 PREPARED BY: J.A. Wagner REVIEWED BY: N.R. Simmons

SEAL: NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 031464
 SIGNATURE: Natasha R. Simmons DATE: 11/8/2016
 SIGNATURE: DATE: 11/8/2016

REVISIONS: INIT. DATE

SIG. INVENTORY NO. 12-0921

Design Loading for METAL POLE NO. 6



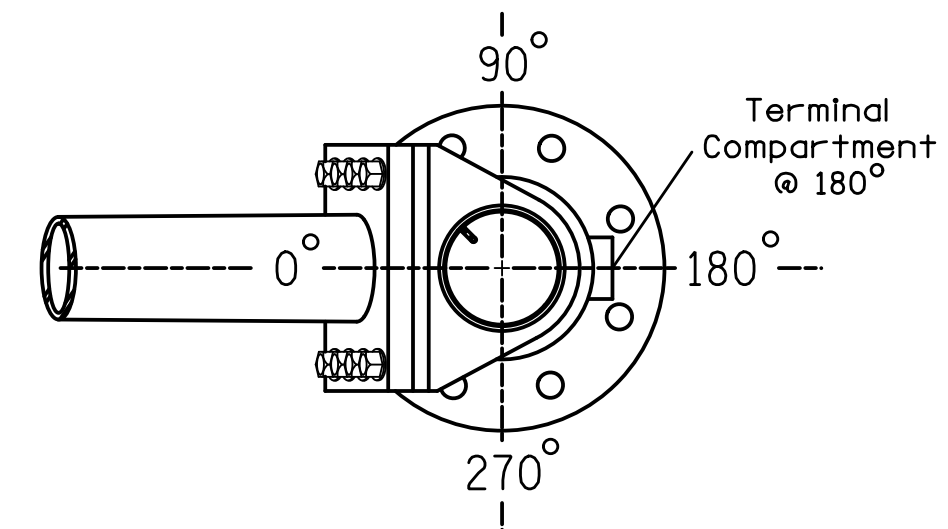
Elevation View

SPECIAL NOTE

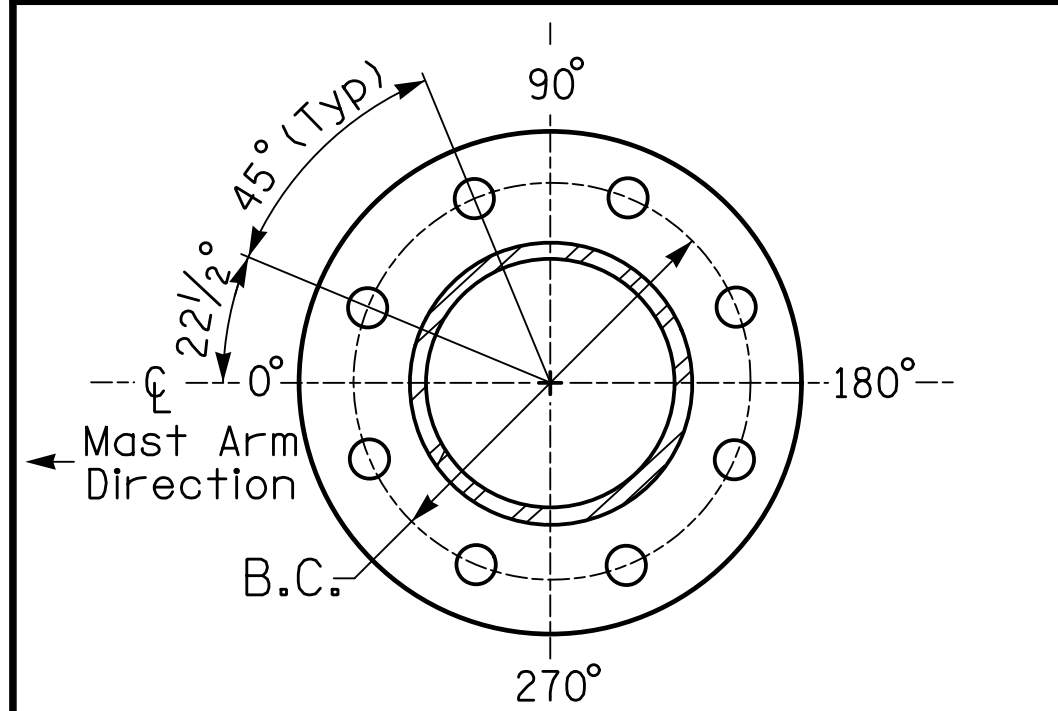
The contractor is responsible for verifying that the mast arm attachment height (H1) will provide the "Design Height" clearance from the roadway before submitting final shop drawings for approval. Verify elevation data below which was obtained by field measurement or from available project survey data.

Elevation Data for Mast Arm Attachment (H1)

| | |
|--|-----------|
| Elevation Differences for: | Pole 6 |
| Baseline reference point at ϕ Foundation @ ground level | 0.0 ft. |
| Elevation difference at High point of roadway surface | +0.65 ft. |
| Elevation difference at Edge of travelway or face of curb | 1.51 ft. |

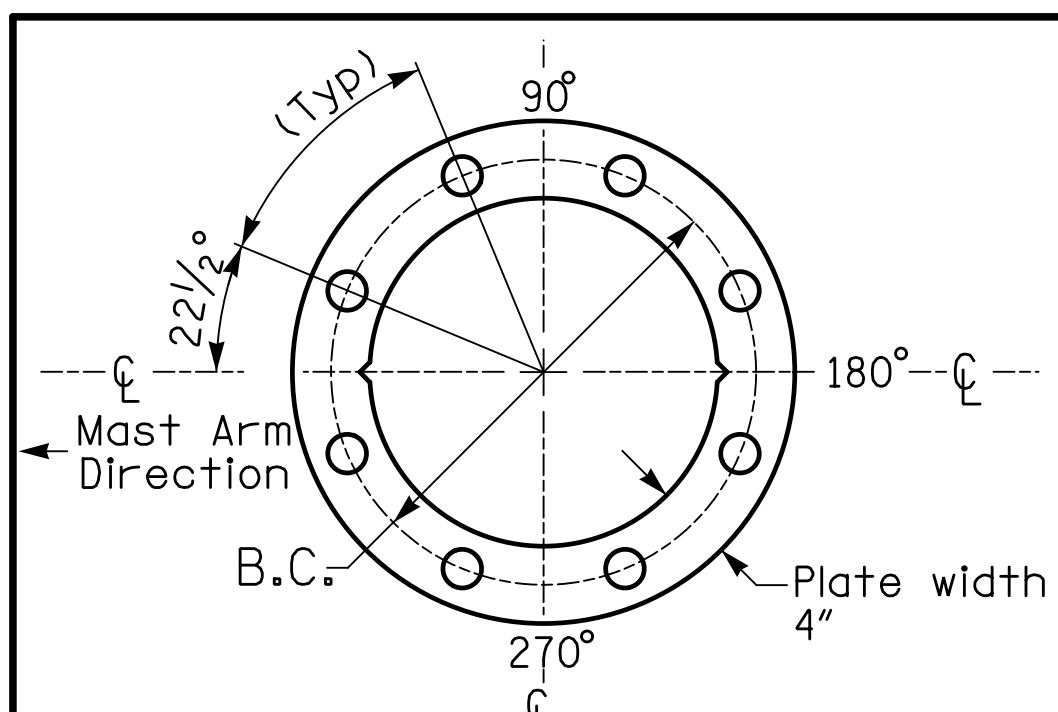


POLE RADIAL ORIENTATION



8 BOLT BASE PLATE DETAIL

See Note 6



BASE PLATE TEMPLATE & ANCHOR BOLT LOCK PLATE DETAIL
For 8 Bolt Base Plate

HNTB HNTB NORTH CAROLINA, P.C.
343 E. Six Forks Road, Suite 200
Raleigh, North Carolina 27609
NC License No: C-1554
(919) 546-8997

METAL POLE No. 6

| | |
|-----------------------|-----------|
| PROJECT REFERENCE NO. | SHEET NO. |
| I-5000 | Sig. 10.2 |

MAST ARM LOADING SCHEDULE

| LOADING SYMBOL | DESCRIPTION | AREA | SIZE | WEIGHT |
|----------------|---|-----------|-------------------------|--------|
| | RIGID MOUNTED SIGNAL HEAD 12"-4 SECTION-WITH BACKPLATE | 11.5 S.F. | 25.5" W X 66.0" L | 74 LBS |
| | RIGID MOUNTED SIGNAL HEAD 12"-3 SECTION-WITH BACKPLATE | 9.3 S.F. | 25.5" W X 52.5" L | 60 LBS |
| | SIGN RIGID MOUNTED | 5.0 S.F. | 24.0" W X 30.0" L | 11 LBS |
| | STREET NAME SIGN RIGID MOUNTED | 16.0 S.F. | 24.0" W X 96.0" L | 36 LBS |

NOTES

DESIGN REFERENCE MATERIAL

- Design the traffic signal structure and foundation in accordance with:
The 6th Edition 2013 AASHTO "Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals, including all of the latest interim revisions.
The 2012 NCDOT "Standard Specifications for Roads and Structures." The latest addenda to the specifications can be found in the traffic signal project special provisions.
The 2012 NCDOT Roadway Standard Drawings.
The traffic signal project plans and special provisions.
The NCDOT "Metal Pole Standards" located at the following NCDOT website:
<https://connect.ncdot.gov/resources/safety/Pages/ITS-Design-Resources.aspx>

DESIGN REQUIREMENTS

- Design the traffic signal structure using the loading conditions shown in the elevation views. These are anticipated worst case "design loads" and may not represent the actual loads that will be applied at the time of the installation. The contractor should refer to the traffic signal plans for the actual loads that will be applied at the time of the installation.
- Design all signal supports using stress ratios that do not exceed 0.9.
- The camber design for the mast arm deflection should provide an appearance of a low pitched arch where the tip or the free end of the mast arm does not deflect below horizontal when fully loaded.
- A clamp-type bolted mast arm-to-pole connection may be used instead of the welded ring stiffened box connection shown as long as the connection meets all of the design requirements.
- Design base plate with 8 anchor bolt holes. Provide 2 inch x 60 inch anchor bolts.
- The mast arm attachment height (H1) shown is based on the following design assumptions:
a. Mast arm slope and deflection are not considered in determining the arm attachment height as they are assumed to offset each other.
b. Signalheads are rigidly mounted and vertically centered on the mast arm.
c. The roadway clearance height for design is as shown in the elevation views.
d. The top of the pole base plate is 0.75 feet above the ground elevation.
e. Refer to the Elevation Data Chart for the elevation differences between the proposed foundation ground level and the high point of the roadway.
- The pole manufacturer will determine the total height (H2) of each pole using the greater of the following:
Mast arm attachment height (H1) plus 2 feet, or
H1 plus 1/2 of the total height of the mast arm attachment assembly plus 1 foot.
- If pole location adjustments are required, the contractor must gain approval from the Engineer as this may affect the mast arm lengths and arm attachment heights. The contractor may contact the Signal Design Section Senior Structural Engineer for assistance at (919) 773-2800.
- The contractor is responsible for verifying that the mast arm length shown will allow proper positioning of the signalheads over the roadway.
- The contractor is responsible for providing soil penetration testing data (SPT) to the pole manufacturer so site specific foundations can be designed.

All metal poles and arms should be black in color as specified in the project special provisions.

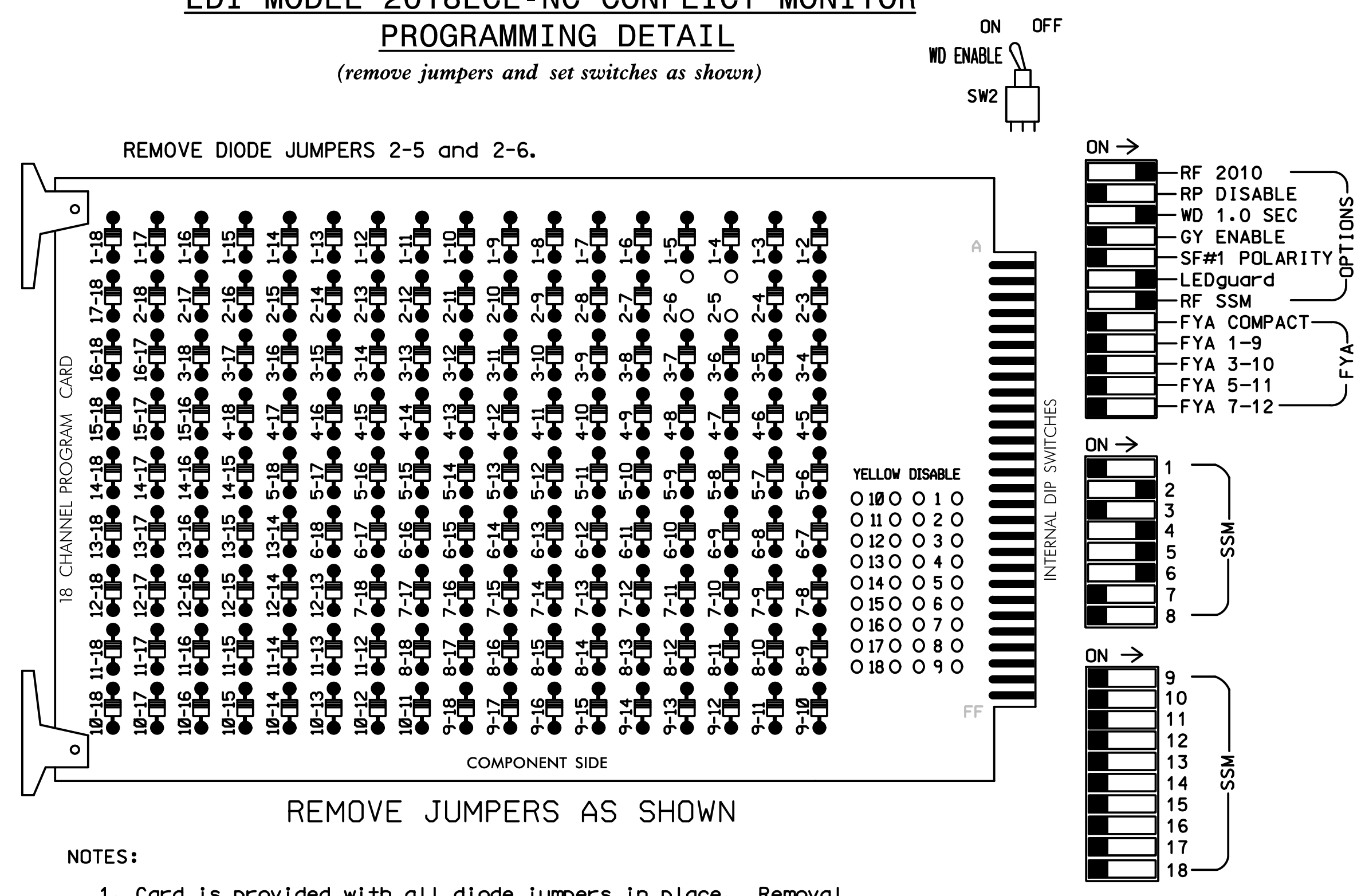
NCDOT Wind Zone 4 (90 mph)

**DOCUMENT NOT CONSIDERED FINAL
UNLESS ALL SIGNATURES COMPLETED**

| | | |
|---|---|--|
| Prepared For TRANSPORTATION MOBILITY AND SAFETY DIVISION NORTH CAROLINA DEPARTMENT OF TRANSPORTATION SIGNAL DESIGN SECTION 750 N. Greenfield Pkwy, Garner, NC 27529 | US 321 (N. Chester Street) at Rankin Lake Road Division 12 Gaston Co. Gastonia PLAN DATE: September 2016 REVIEWED BY: A.D. Klinksiek PREPARED BY: T.R. Terrell REVIEWED BY: N.R. Simmons | SEAL NATASHA R. SIMMONS ENGINEER |
| | SCALE 0 N/A NONE | REVISIONS INIT. DATE |

EDI MODEL 2018ECL-NC CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)



NOTES

- To prevent "flash-conflict" problems, insert red flash program blocks for all unused vehicle load switches in the output file. The installer shall verify that signal heads flash in accordance with the Signal Plans.
- Enable Simultaneous Gap-Out for all phases.
- Program phases 2 and 6 for Variable Initial and Gap Reduction.
- Program phases 2 and 6 for Start Up In Green.
- Program phases 2 and 6 for Yellow Flash.
- The cabinet and controller are part of the Gastonia City Signal System.

SIGNAL HEAD HOOK-UP CHART

| LOAD SWITCH NO. | S1 | S2 | S3 | S4 | S5 | S6 | S7 | S8 | S9 | S10 | S11 | S12 |
|-----------------|----|-----------|-------|----|-----------|-------|----|-------|-------|-----|-----|-------|
| CMU CHANNEL NO. | 1 | 2 | 13 | 3 | 4 | 14 | 5 | 6 | 15 | 7 | 8 | 16 |
| PHASE | 1 | 2 | 2 PED | 3 | 4 | 4 PED | 5 | 6 | 6 PED | 7 | 8 | 8 PED |
| SIGNAL HEAD NO. | NU | 21,22, 23 | NU | NU | 41,42, 43 | NU | 51 | 61,62 | NU | NU | NU | NU |
| RED | | 128 | | | | | | 134 | | | | |
| YELLOW | | 129 | | | | | | 135 | | | | |
| GREEN | | 130 | | | | | | 136 | | | | |
| RED ARROW | | | | | 101 | | | 131 | | | | |
| YELLOW ARROW | | | | | 102 | | | 132 | | | | |
| GREEN ARROW | | | | | 103 | | | 133 | | | | |
| Hand icon | | | | | | | | | | | | |
| Person icon | | | | | | | | | | | | |

NU = Not Used

EQUIPMENT INFORMATION

CONTROLLER.....2070
 CABINET.....332
 SOFTWARE.....ECONOLITE OASIS
 CABINET MOUNT.....BASE
 OUTPUT FILE POSITIONS...12
 LOAD SWITCHES USED.....S2,S5,S7,S8
 PHASES USED.....2,4,5,6
 OVERLAPS.....NONE

INPUT FILE POSITION LAYOUT

(front view)

| FILE | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 |
|------|----------|--------|--------|--------|--------|--------|----------|--------|--------|--------|--------|--------|--------|-------------|
| U | ∅2/SYS | ∅2/SYS | ∅2/SYS | ∅2/SYS | ∅2/SYS | ∅4 | ∅4 | ∅2/SYS | ∅2/SYS | ∅2/SYS | ∅2/SYS | ∅2/SYS | ∅2/SYS | FS |
| I | 2A/S1 | 2A/S1 | 2A/S1 | 2A/S1 | 2A/S1 | 4A | 4C | ∅2/SYS | ∅2/SYS | ∅2/SYS | ∅2/SYS | ∅2/SYS | ∅2/SYS | DC ISOLATOR |
| L | ∅2/SYS | ∅2/SYS | ∅2/SYS | ∅2/SYS | ∅2/SYS | ∅4 | NOT USED | ∅2/SYS | ∅2/SYS | ∅2/SYS | ∅2/SYS | ∅2/SYS | ∅2/SYS | ST |
| U | ∅5 | ∅6/SYS | ∅6/SYS | ∅6/SYS | ∅6/SYS | ∅6/SYS | ∅6/SYS | ∅6/SYS | ∅6/SYS | ∅6/SYS | ∅6/SYS | ∅6/SYS | ∅6/SYS | DC ISOLATOR |
| J | 5A | 6A/S3 | 6A/S3 | 6A/S3 | 6A/S3 | 6A/S3 | 6A/S3 | 6A/S3 | 6A/S3 | 6A/S3 | 6A/S3 | 6A/S3 | 6A/S3 | |
| L | NOT USED | ∅6/SYS | ∅6/SYS | ∅6/SYS | ∅6/SYS | ∅6/SYS | ∅6/SYS | ∅6/SYS | ∅6/SYS | ∅6/SYS | ∅6/SYS | ∅6/SYS | ∅6/SYS | |
| | 6B/S4 | 6B/S4 | 6B/S4 | 6B/S4 | 6B/S4 | 6B/S4 | 6B/S4 | 6B/S4 | 6B/S4 | 6B/S4 | 6B/S4 | 6B/S4 | 6B/S4 | |

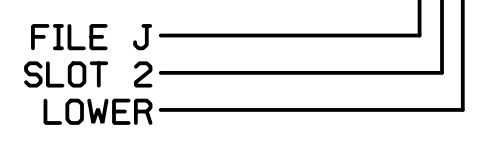
EX. : 1A, 2A, ETC. = LOOP NO.'S

FS = FLASH SENSE
 ST = STOP TIME

INPUT FILE CONNECTION & PROGRAMMING CHART

| LOOP NO. | LOOP TERMINAL | INPUT FILE POS. | PIN NO. | INPUT ASSIGNMENT NO. | DETECTOR NO. | NEMA PHASE | CALL | EXTEND | FULL TIME DELAY | STRETCH TIME | DELAY TIME |
|----------|---------------|-----------------|---------|----------------------|--------------|------------|------|--------|-----------------|--------------|------------|
| 2A/S1 | TB2-5,6 | I2U | 39 | 1 | 2 | 2/SYS | Y | Y | | | |
| 2B/S2 | TB2-7,8 | I2L | 43 | 5 | 12 | 2/SYS | Y | Y | | | |
| 4A | TB4-9,10 | I6U | 41 | 3 | 4 | 4 | Y | Y | | | |
| 4B | TB4-11,12 | I6L | 45 | 7 | 14 | 4 | Y | Y | | | |
| 4C | TB6-1,2 | I7U | 65 | 27 | 34 | 4 | Y | Y | | | |
| 5A | TB3-1,2 | J1U | 55 | 17 | 5 | 5 | Y | Y | | | |
| 6A/S3 | TB3-5,6 | J2U | 40 | 2 | 6 | 6/SYS | Y | Y | | | |
| 6B/S4 | TB3-7,8 | J2L | 44 | 6 | 16 | 6/SYS | Y | Y | | | |

INPUT FILE POSITION LEGEND: J2L



THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 12-0023T1
 DESIGNED: September 2016
 SEALED: 11-08-2016
 REVISED:

Temporary Signal
 Phase 1, Step 1

DOCUMENT NOT CONSIDERED FINAL
 UNLESS ALL SIGNATURES COMPLETED

ELECTRICAL AND PROGRAMMING DETAILS FOR:

Prepared for:
 Transportation Mobility and Safety Solutions
 STATE OF NORTH CAROLINA
 Signal Management Section

750 N. Greenfield Pkwy, Garner, NC 27529

US 321 (N. Chester Street)
 at
 I-85 Southbound Ramp

Division 12 Gaston Co. Gastonia

PLAN DATE: September 2016 REVIEWED BY: T.R. Terrell
 PREPARED BY: J.A. Wagner REVIEWED BY: N.R. Simmons

| REVISIONS | INIT. | DATE |
|-----------|-------|------|
| | | |

SEAL

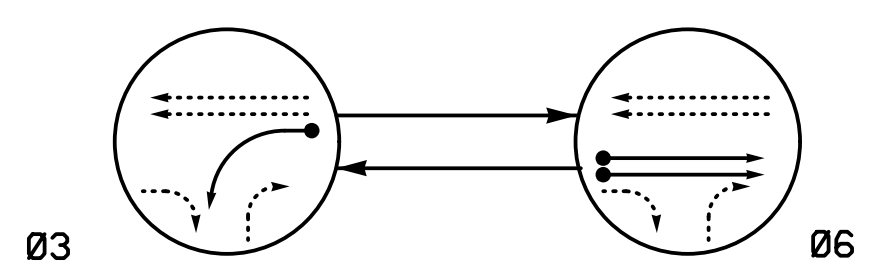
SEAL 031464
 NATASHA R. SIMMONS
 ENGINEER

DocuSigned by:
 Natasha R. Simmons 11/8/2016
 SIGNATURE DATE

SIG. INVENTORY NO. 12-0023T1

HNTB HNTB NORTH CAROLINA, P.C.
 343 E. Six Forks Road, Suite 200
 Raleigh, North Carolina 27609
 NC License No: C-1554
 (919) 546-8997

PHASING DIAGRAM



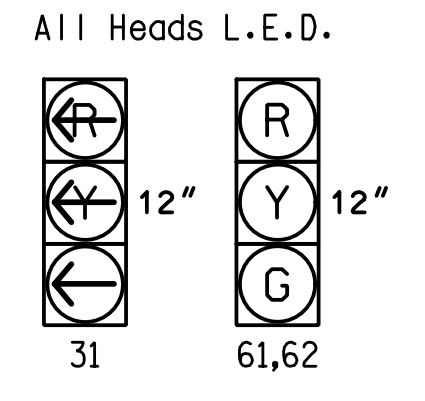
PHASING DIAGRAM DETECTION LEGEND

- DETECTED MOVEMENT
- UNDETECTED MOVEMENT (OVERLAP)
- ⋯ UNSIGNALIZED MOVEMENT
- ⚡ PEDESTRIAN MOVEMENT

TABLE OF OPERATION

| SIGNAL FACE | PHASE | | | FLASH |
|-------------|-------|----|---|-------|
| | 03 | 06 | | |
| 31 | --- | R | R | |
| 61,62 | R | G | Y | |

SIGNAL FACE I.D.



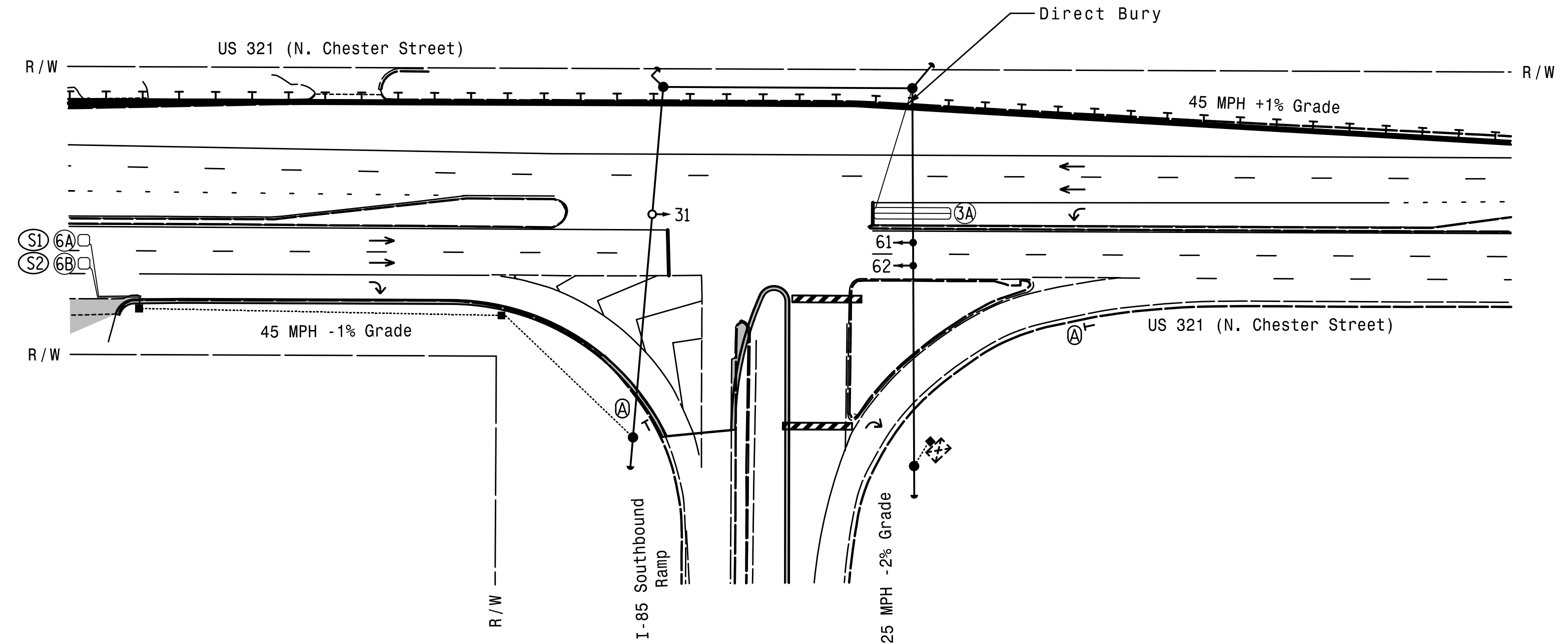
OASIS 2070 LOOP & DETECTOR INSTALLATION CHART

| LOOP | SIZE (FT) | DISTANCE FROM STOPBAR (FT) | TURNS | NEW LOOP | DETECTOR PROGRAMMING | | | | | | | |
|-------|-----------|----------------------------|-------|----------|----------------------|---------|-----------|-----------------|--------------|------------|-------------|----------|
| | | | | | PHASE | CALLING | EXTENSION | FULL TIME DELAY | STRETCH TIME | DELAY TIME | SYSTEM LOOP | NEW CARD |
| 3A | 6X40 | 0 | 2-4-2 | Y | 3 | Y | Y | - | - | - | - | Y |
| 6A/S1 | 6X6 | 300 | 6 | Y | 6 | Y | Y | - | - | - | - | Y |
| 6B/S2 | 6X6 | 300 | 6 | Y | 6 | Y | Y | - | - | - | - | Y |

2 Phase Fully Actuated (Gastonia City Signal System)

NOTES

- Refer to "Roadway Standard Drawings NCDOT" dated January 2012 and "Standard Specifications for Roads and Structures" dated January 2012.
- Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
- Set all detector units to presence mode.
- Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.
- Signal System data: Controller Asset #0023.



OASIS 2070 TIMING CHART

| FEATURE | PHASE | |
|-------------------------|-------|------------|
| | 3 | 6 |
| Min Green 1 * | 7 | 12 |
| Extension 1 * | 2.0 | 6.0 |
| Max Green 1 * | 20 | 90 |
| Yellow Clearance | 3.0 | 4.6 |
| Red Clearance | 2.8 | 1.7 |
| Red Revert | 2.0 | 2.0 |
| Walk 1 * | - | - |
| Don't Walk 1 | - | - |
| Seconds Per Actuation * | - | 1.5 |
| Max Variable Initial * | - | 34 |
| Time Before Reduction * | - | 15 |
| Time To Reduce * | - | 30 |
| Minimum Gap | - | 3.0 |
| Recall Mode | - | MIN RECALL |
| Vehicle Call Memory | - | YELLOW |
| Dual Entry | - | - |
| Simultaneous Gap | ON | ON |

* These values may be field adjusted. Do not adjust Min Green and Extension times for phase 6 lower than what is shown. Min Green for all other phases should not be lower than 4 seconds.

LEGEND

- | PROPOSED | EXISTING |
|--|--|
| ○ → Traffic Signal Head | ● → Traffic Signal Head |
| ○ → Modified Signal Head | N/A |
| ⊥ Sign | ⊥ Sign |
| ⊥ Pedestrian Signal Head With Push Button & Sign | ⊥ Pedestrian Signal Head With Push Button & Sign |
| ○ → Signal Pole with Guy | ● → Signal Pole with Guy |
| ○ → Signal Pole with Sidewalk Guy | ● → Signal Pole with Sidewalk Guy |
| ⊃ Inductive Loop Detector | ⊃ Inductive Loop Detector |
| ⊠ Controller & Cabinet | ⊠ Controller & Cabinet |
| □ Junction Box | □ Junction Box |
| --- 2-in Underground Conduit | --- 2-in Underground Conduit |
| N/A Right of Way | --- Right of Way |
| N/A Directional Arrow | → Directional Arrow |
| N/A Guardrail | ⊥ Guardrail |
| ⊠ "YIELD" Sign (R1-2) | ⊠ "YIELD" Sign (R1-2) |
| Construction Zone | N/A |
| Construction Zone Barricade | N/A |

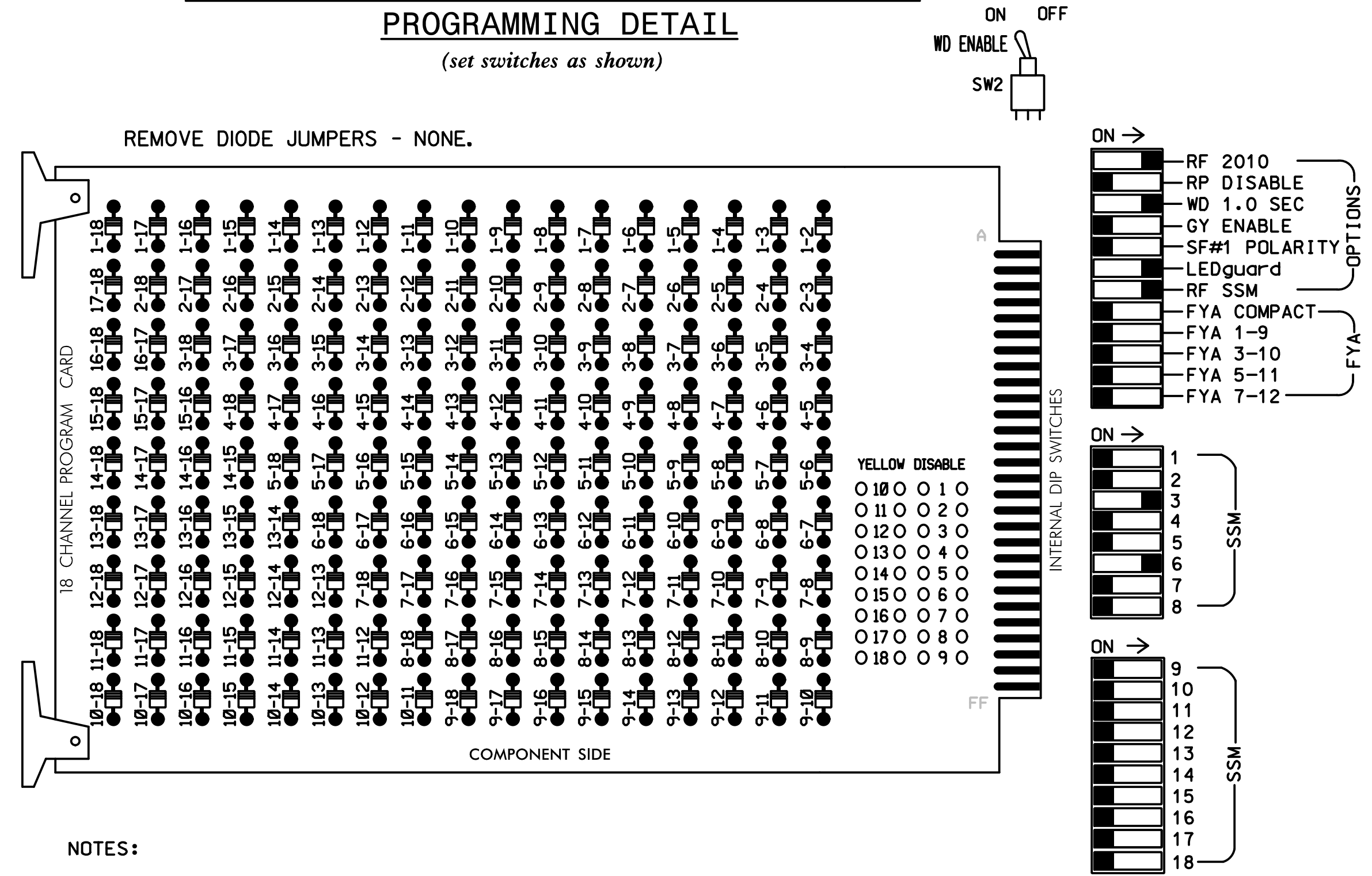
Temporary Signal Phase 1, Step 5

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

| | | | |
|--|--|---|--|
| | US 321 (N. Chester Street) at I-85 Southbound Ramp | | |
| | Division 12 Gaston Co. Gastonia | PLAN DATE: September 2016 REVIEWED BY: T.R. Terrell | |
| 750 N. Greenfield Pkwy, Garner, NC 27529 | SCALE: 1"=50' | REVISIONS: | DocuSigned by: <i>Natasha R. Simmons</i> 11/8/2016 |
| HNTB HNTB NORTH CAROLINA, P.C. 343 E. Six Forks Road, Suite 200 Raleigh, North Carolina 27609 NC License No: C-1554 (919) 546-8997 | | INIT. DATE | SIGNATURE DATE |
| | | | SIG. INVENTORY NO. 12-002372 |

EDI MODEL 2018ECL-NC CONFLICT MONITOR PROGRAMMING DETAIL

(set switches as shown)



NOTES:

1. Card is provided with all diode jumpers in place. Removal of any jumper allows its channels to run concurrently.
2. Ensure jumpers SEL2-SEL5 and SEL9 are present on the monitor board.
3. Ensure that Red Enable is active at all times during normal operation.
4. Connect serial cable from conflict monitor to comm. port 1 of 2070 controller. Ensure conflict monitor communicates with 2070.

NOTES

1. To prevent "flash-conflict" problems, insert red flash program blocks for all unused vehicle load switches in the output file. The installer shall verify that signal heads flash in accordance with the Signal Plans.
2. Enable Simultaneous Gap-Out for all phases.
3. Program phase 6 for Variable Initial and Gap Reduction.
4. Program phase 6 for Start Up In Green.
5. Program phase 6 for Yellow Flash.
6. The cabinet and controller are part of the Gastonia City Signal System.

EQUIPMENT INFORMATION

CONTROLLER.....2070
 CABINET.....332
 SOFTWARE.....ECONOLITE OASIS
 CABINET MOUNT.....BASE
 OUTPUT FILE POSITIONS...12
 LOAD SWITCHES USED.....S4,S8
 PHASES USED.....3,6
 OVERLAPS.....NONE

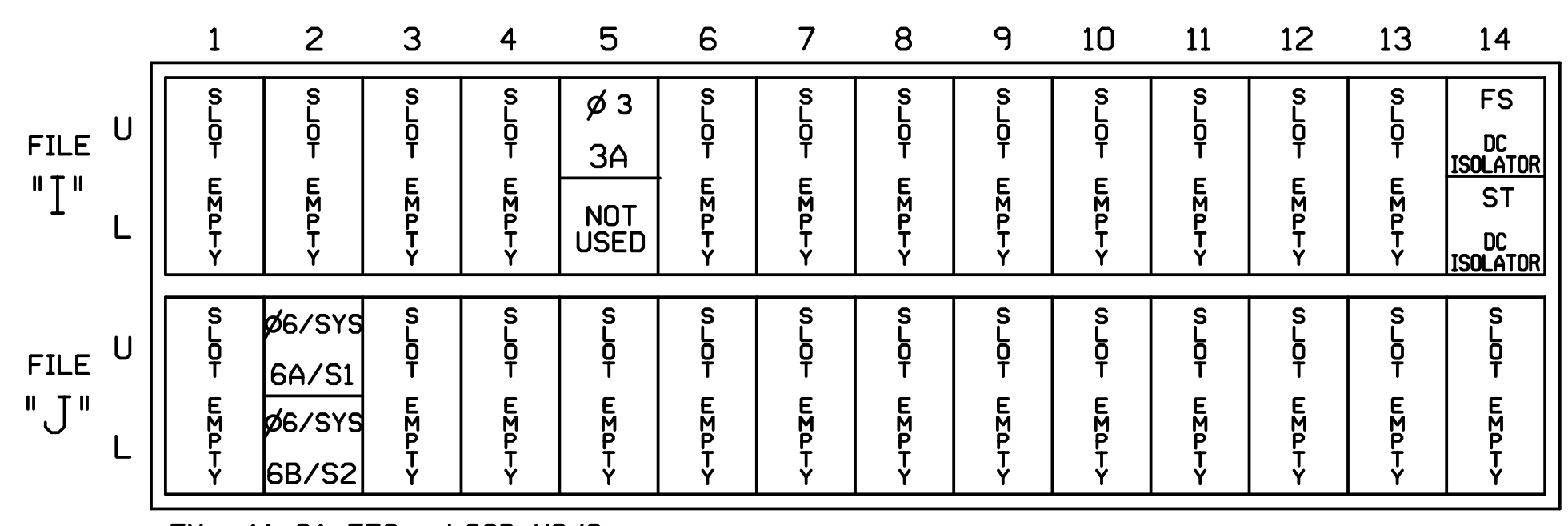
SIGNAL HEAD HOOK-UP CHART

| LOAD SWITCH NO. | S1 | S2 | S3 | S4 | S5 | S6 | S7 | S8 | S9 | S10 | S11 | S12 |
|-----------------|----|----|-------|-----|----|-------|----|-------|-------|-----|-----|-------|
| CMU CHANNEL NO. | 1 | 2 | 13 | 3 | 4 | 14 | 5 | 6 | 15 | 7 | 8 | 16 |
| PHASE | 1 | 2 | 2 PED | 3 | 4 | 4 PED | 5 | 6 | 6 PED | 7 | 8 | 8 PED |
| SIGNAL HEAD NO. | NU | NU | NU | 31 | NU | NU | NU | 61,62 | NU | NU | NU | NU |
| RED | | | | | | | | 134 | | | | |
| YELLOW | | | | | | | | 135 | | | | |
| GREEN | | | | | | | | 136 | | | | |
| RED ARROW | | | | 116 | | | | | | | | |
| YELLOW ARROW | | | | 117 | | | | | | | | |
| GREEN ARROW | | | | 118 | | | | | | | | |
| Hand icon | | | | | | | | | | | | |
| Person icon | | | | | | | | | | | | |

NU = Not Used

INPUT FILE POSITION LAYOUT

(front view)



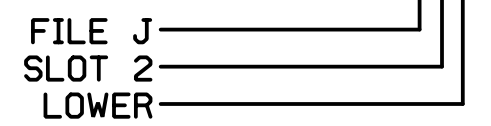
EX. : 1A, 2A, ETC. = LOOP NO.'S

FS = FLASH SENSE
 ST = STOP TIME

INPUT FILE CONNECTION & PROGRAMMING CHART

| LOOP NO. | LOOP TERMINAL | INPUT FILE POS. | PIN NO. | INPUT ASSIGNMENT NO. | DETECTOR NO. | NEMA PHASE | CALL | EXTEND | FULL TIME DELAY | STRETCH TIME | DELAY TIME |
|----------|---------------|-----------------|---------|----------------------|--------------|------------|------|--------|-----------------|--------------|------------|
| 3A | TB4-5,6 | ISU | 58 | 20 | 3 | 3 | Y | Y | | | |
| 6A/S1 | TB3-5,6 | J2U | 40 | 2 | 6 | 6/SYS | Y | Y | | | |
| 6B/S2 | TB3-7,8 | J2L | 44 | 6 | 16 | 6/SYS | Y | Y | | | |

INPUT FILE POSITION LEGEND: J2L



THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 12-0023T2
 DESIGNED: September 2016
 SEALED: 11-08-2016
 REVISED:

Temporary Signal
 Phase 1, Step 5

**DOCUMENT NOT CONSIDERED FINAL
 UNLESS ALL SIGNATURES COMPLETED**

ELECTRICAL AND PROGRAMMING DETAILS FOR:

US 321 (N. Chester Street)
 at
 I-85 Southbound Ramp

Division 12 Gaston Co. Gastonia

PLAN DATE: September 2016 REVIEWED BY: T.R. Terrell
 PREPARED BY: J.A. Wagner REVIEWED BY: N.R. Simmons

| REVISIONS | INIT. | DATE |
|-----------|-------|------|
| | | |

SEAL

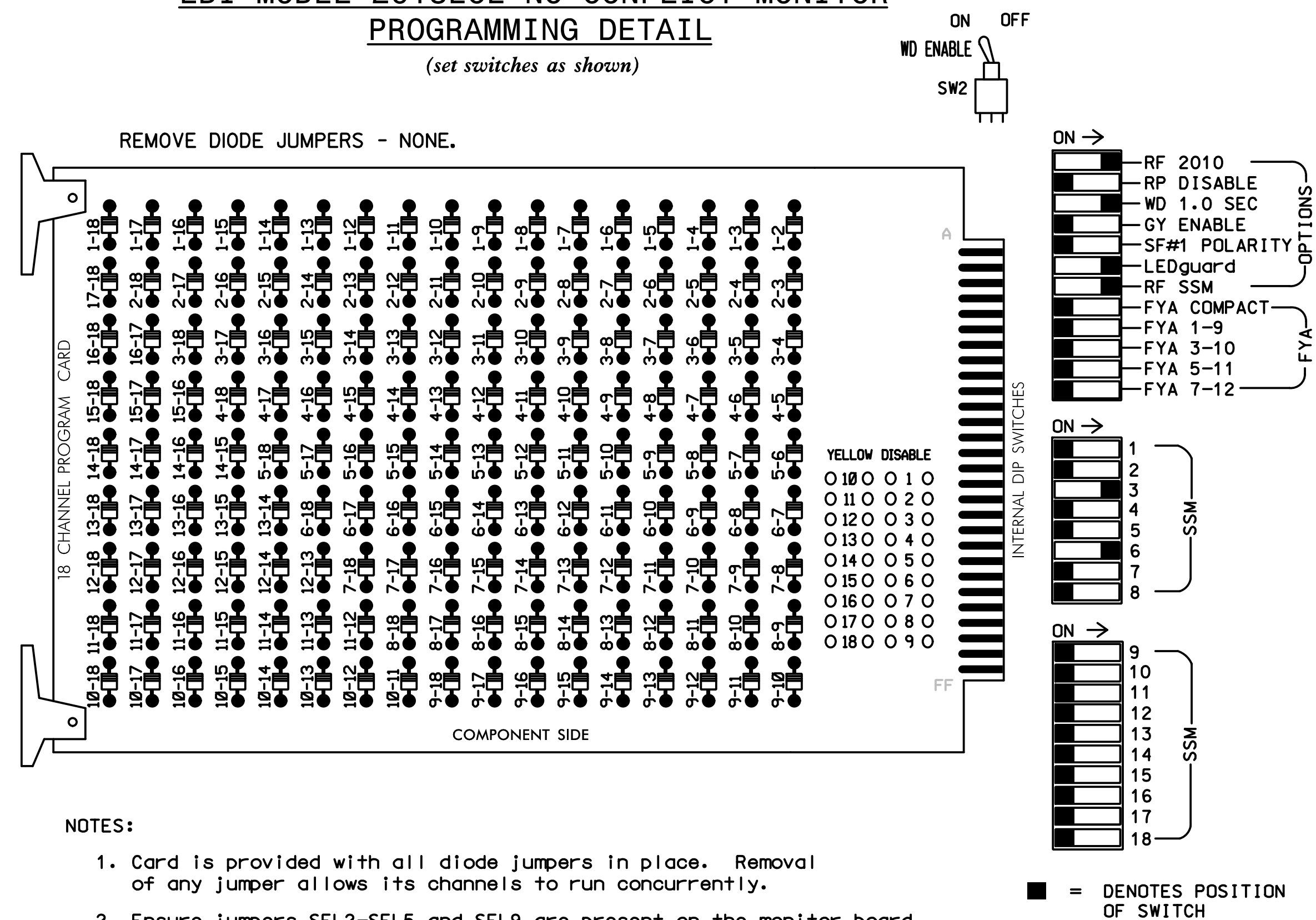
DocuSigned by:
 Natasha R. Simmons 11/8/2016
 SIGNATURE DATE

SIG. INVENTORY NO. 12-0023T2

HNTB NORTH CAROLINA, P.C.
 343 E. Six Forks Road, Suite 200
 Raleigh, North Carolina 27609
 NC License No: C-1554
 (919) 546-8997

EDI MODEL 2018ECL-NC CONFLICT MONITOR PROGRAMMING DETAIL

(set switches as shown)



NOTES:

1. Card is provided with all diode jumpers in place. Removal of any jumper allows its channels to run concurrently.
2. Ensure jumpers SEL2-SEL5 and SEL9 are present on the monitor board.
3. Ensure that Red Enable is active at all times during normal operation.
4. Connect serial cable from conflict monitor to comm. port 1 of 2070 controller. Ensure conflict monitor communicates with 2070.

NOTES

1. To prevent "flash-conflict" problems, insert red flash program blocks for all unused vehicle load switches in the output file. The installer shall verify that signal heads flash in accordance with the Signal Plans.
2. Enable Simultaneous Gap-Out for all phases.
3. Program phase 6 for Variable Initial and Gap Reduction.
4. Program phase 6 for Start Up In Green.
5. Program phase 6 for Yellow Flash.
6. The cabinet and controller are part of the Gastonia City Signal System.

EQUIPMENT INFORMATION

CONTROLLER.....2070
 CABINET.....332
 SOFTWARE.....ECONOLITE OASIS
 CABINET MOUNT.....BASE
 OUTPUT FILE POSITIONS...12
 LOAD SWITCHES USED.....S4,S8
 PHASES USED.....3,6
 OVERLAPS.....NONE

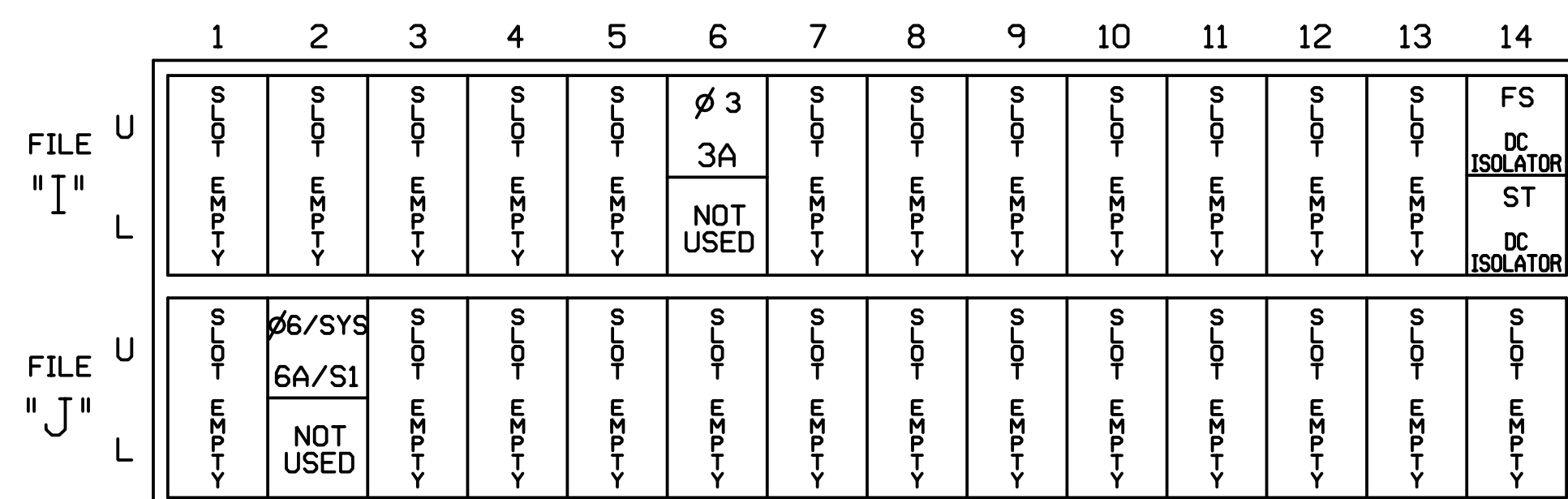
SIGNAL HEAD HOOK-UP CHART

| LOAD SWITCH NO. | S1 | S2 | S3 | S4 | S5 | S6 | S7 | S8 | S9 | S10 | S11 | S12 |
|-----------------|----|----|-------|-----|----|-------|----|-------|-------|-----|-----|-------|
| CMU CHANNEL NO. | 1 | 2 | 13 | 3 | 4 | 14 | 5 | 6 | 15 | 7 | 8 | 16 |
| PHASE | 1 | 2 | 2 PED | 3 | 4 | 4 PED | 5 | 6 | 6 PED | 7 | 8 | 8 PED |
| SIGNAL HEAD NO. | NU | NU | NU | 31 | NU | NU | NU | 61,62 | NU | NU | NU | NU |
| RED | | | | | | | | 134 | | | | |
| YELLOW | | | | | | | | 135 | | | | |
| GREEN | | | | | | | | 136 | | | | |
| RED ARROW | | | | 116 | | | | | | | | |
| YELLOW ARROW | | | | 117 | | | | | | | | |
| GREEN ARROW | | | | 118 | | | | | | | | |
| Hand icon | | | | | | | | | | | | |
| Person icon | | | | | | | | | | | | |

NU = Not Used

INPUT FILE POSITION LAYOUT

(front view)



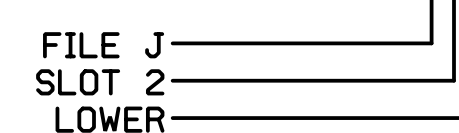
EX. : 1A, 2A, ETC. = LOOP NO.'S

FS = FLASH SENSE
 ST = STOP TIME

INPUT FILE CONNECTION & PROGRAMMING CHART

| LOOP NO. | LOOP TERMINAL | INPUT FILE POS. | PIN NO. | INPUT ASSIGNMENT NO. | DETECTOR NO. | NEMA PHASE | CALL | EXTEND | FULL TIME DELAY | STRETCH TIME | DELAY TIME |
|----------|---------------|-----------------|---------|----------------------|--------------|------------|------|--------|-----------------|--------------|------------|
| 3A | TB4-9,10 | 16U | 41 | 3 | 4 | 3 | Y | Y | | | |
| 6A/S1 | TB3-5,6 | J2U | 40 | 2 | 6 | 6/SYS | Y | Y | | | |

INPUT FILE POSITION LEGEND: J2L

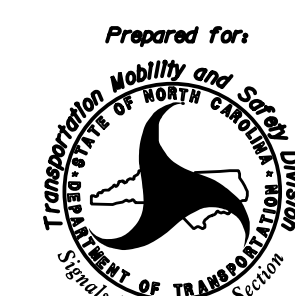


THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 12-0023T3
 DESIGNED: September 2016
 SEALED: 11-08-2016
 REVISED:

Temporary Signal
 Phase 1, Steps 6 & 7

DOCUMENT NOT CONSIDERED FINAL
 UNLESS ALL SIGNATURES COMPLETED

ELECTRICAL AND PROGRAMMING
 DETAILS FOR:



US 321 (N. Chester Street)
 at
 I-85 Southbound Ramp

Division 12 Gaston Co. Gastonia
 PLAN DATE: September 2016 REVIEWED BY: T.R. Terrell
 PREPARED BY: J.A. Wagner REVIEWED BY: N.R. Simmons

| REVISIONS | INIT. | DATE |
|-----------|-------|------|
| | | |



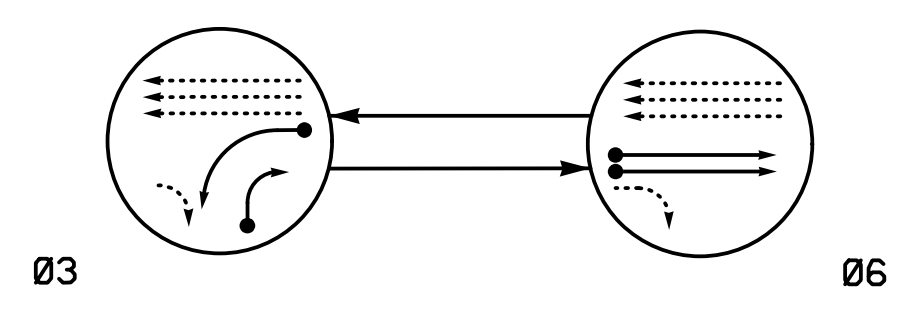
DocuSigned by:
 Natasha R. Simmons
 11/8/2016
 SIGNATURE DATE
 SIG. INVENTORY NO. 12-0023T3



HNTB NORTH CAROLINA, P.C.
 343 E. Six Forks Road, Suite 200
 Raleigh, North Carolina 27609
 NC License No: C-1554
 (919) 546-8997

750 N. Greenfield Pkwy, Garner, NC 27529

PHASING DIAGRAM



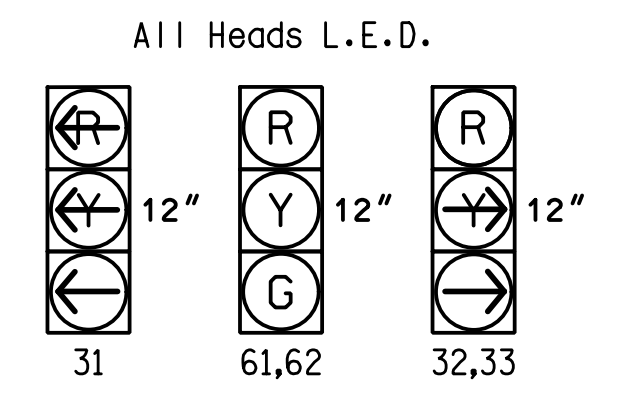
PHASING DIAGRAM DETECTION LEGEND

- ←● DETECTED MOVEMENT
- ← UNDETECTED MOVEMENT (OVERLAP)
- ←... UNSIGNALIZED MOVEMENT
- ←- - - PEDESTRIAN MOVEMENT

TABLE OF OPERATION

| SIGNAL FACE | PHASE | | |
|-------------|-------|-----|---------|
| | Ø 3 | Ø 6 | F LIGHT |
| 31 | — | — | — |
| 32,33 | — | R | R |
| 61,62 | R | G | Y |

SIGNAL FACE I.D.



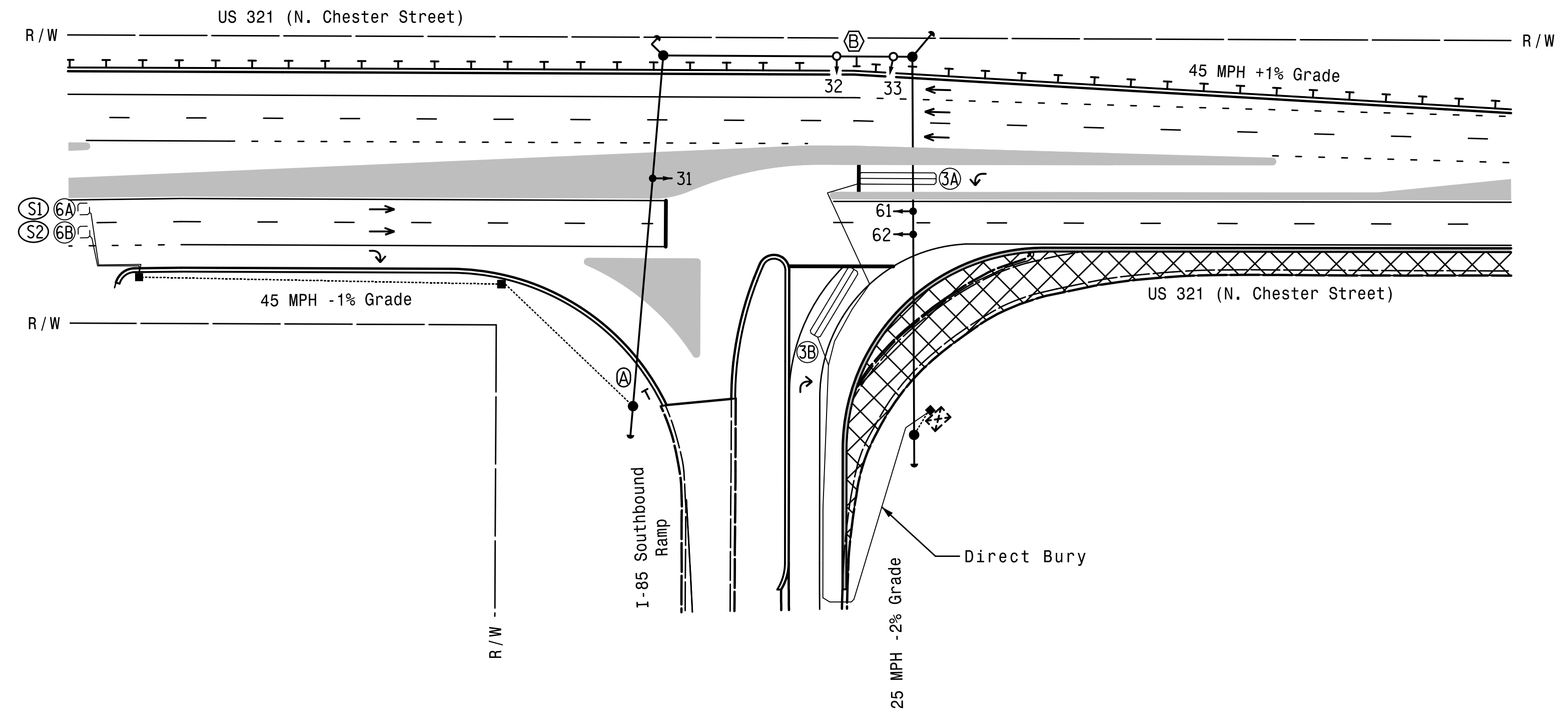
OASIS 2070 LOOP & DETECTOR INSTALLATION CHART

| LOOP | SIZE (FT) | DISTANCE FROM STOPBAR (FT) | TURNS | NEW LOOP | DETECTOR PROGRAMMING | | | | | | | |
|-------|-----------|----------------------------|-------|----------|----------------------|---------|-----------|-----------------|--------------|------------|-------------|----------|
| | | | | | PHASE | CALLING | EXTENSION | FULL TIME DELAY | STRETCH TIME | DELAY TIME | SYSTEM LOOP | NEW CARD |
| 3A | 6X40 | 0 | 2-4-2 | Y | 3 | Y | Y | - | - | - | - | - |
| 3B | 6X40 | 0 | 2-4-2 | Y | 3 | Y | Y | - | - | 15 | - | Y |
| 6A/S1 | 6X6 | 300 | 6 | - | 6 | Y | Y | - | - | - | - | - |
| 6B/S2 | 6X6 | 300 | 6 | - | 6 | Y | Y | - | - | - | - | - |

2 Phase Fully Actuated (Gastonia City Signal System)

NOTES

- Refer to "Roadway Standard Drawings NCDOT" dated January 2012 and "Standard Specifications for Roads and Structures" dated January 2012.
- Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
- Reposition existing signal heads 31, 61, and 62.
- Set all detector units to presence mode.
- Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.
- Signal System data: Controller Asset #0023.



OASIS 2070 TIMING CHART

| FEATURE | PHASE | |
|-------------------------|-------|------------|
| | 3 | 6 |
| Min Green 1 * | 7 | 12 |
| Extension 1 * | 2.0 | 6.0 |
| Max Green 1 * | 25 | 90 |
| Yellow Clearance | 3.0 | 4.6 |
| Red Clearance | 2.4 | 1.8 |
| Red Revert | 2.0 | 2.0 |
| Walk 1 * | - | - |
| Don't Walk 1 | - | - |
| Seconds Per Actuation * | - | 1.5 |
| Max Variable Initial * | - | 34 |
| Time Before Reduction * | - | 15 |
| Time To Reduce * | - | 30 |
| Minimum Gap | - | 3.0 |
| Recall Mode | - | MIN RECALL |
| Vehicle Call Memory | - | YELLOW |
| Dual Entry | - | - |
| Simultaneous Gap | ON | ON |

* These values may be field adjusted. Do not adjust Min Green and Extension times for phase 6 lower than what is shown. Min Green for all other phases should not be lower than 4 seconds.

LEGEND

| PROPOSED | EXISTING |
|--|--|
| ○ → Traffic Signal Head | ● → Traffic Signal Head |
| ○ → Modified Signal Head | N/A |
| ⊥ Sign | ⊥ Sign |
| ○ ⊥ Pedestrian Signal Head With Push Button & Sign | ○ ⊥ Pedestrian Signal Head With Push Button & Sign |
| ○ ⊥ Signal Pole with Guy | ○ ⊥ Signal Pole with Guy |
| ○ ⊥ Signal Pole with Sidewalk Guy | ○ ⊥ Signal Pole with Sidewalk Guy |
| ⊠ Inductive Loop Detector | ⊠ Inductive Loop Detector |
| ⊠ Controller & Cabinet | ⊠ Controller & Cabinet |
| ⊠ Junction Box | ⊠ Junction Box |
| --- 2-in Underground Conduit | --- 2-in Underground Conduit |
| N/A Right of Way | --- Right of Way |
| N/A Directional Arrow | → Directional Arrow |
| N/A Guardrail | — — — Guardrail |
| ⊠ "YIELD" Sign (R1-2) | ⊠ "YIELD" Sign (R1-2) |
| ⊠ Right Arrow "ONLY" Sign (R3-5R) | ⊠ Right Arrow "ONLY" Sign (R3-5R) |
| Construction Zone | N/A |

Temporary Signal Phase 2, Step 1

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

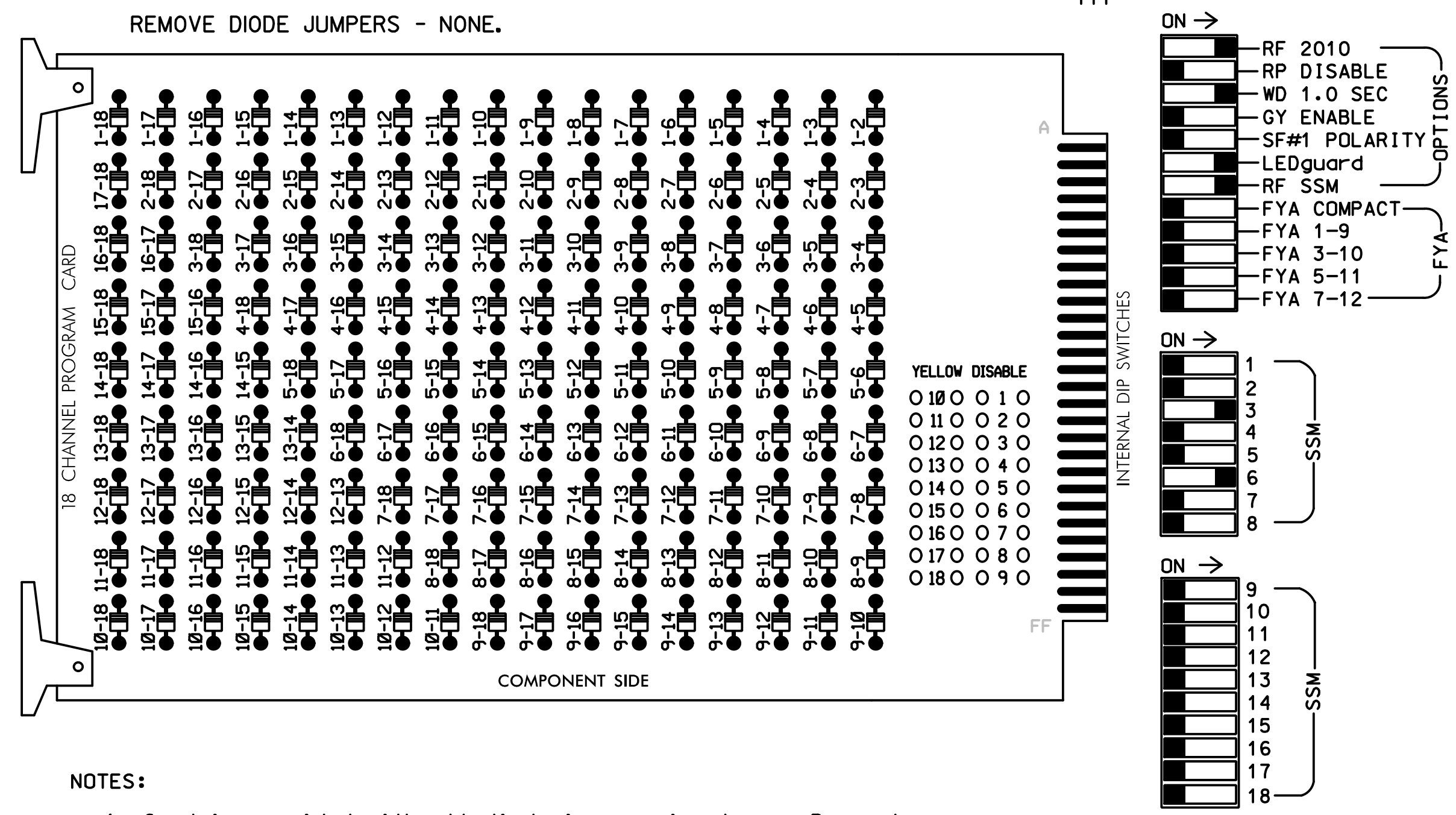
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|--|--|---------------------------|-----------|
| | US 321 (N. Chester Street) at I-85 Southbound Ramp | | |
| | Division 12 Gaston Co. Gastonia | PLAN DATE: September 2016 | |
| PREPARED BY: J.A. Wagner | REVIEWED BY: N.R. Simmons | 11/8/2016 | DATE |
| REVISIONS | INIT. | DATE | SIGNATURE |
| 750 N. Greenfield Pkwy, Garner, NC 27529 | SCALE: 1"=50' | 11/8/2016 | DATE |

HNTB HNTB NORTH CAROLINA, P.C.
 343 E. Six Forks Road, Suite 200
 Raleigh, North Carolina 27609
 NC License No: C-1554
 (919) 546-8997

EDI MODEL 2018ECL-NC CONFLICT MONITOR

PROGRAMMING DETAIL

(set switches as shown)



NOTES:

1. Card is provided with all diode jumpers in place. Removal of any jumper allows its channels to run concurrently.
2. Ensure jumpers SEL2-SEL5 and SEL9 are present on the monitor board.
3. Ensure that Red Enable is active at all times during normal operation.
4. Connect serial cable from conflict monitor to comm. port 1 of 2070 controller. Ensure conflict monitor communicates with 2070.

NOTES

1. To prevent "flash-conflict" problems, insert red flash program blocks for all unused vehicle load switches in the output file. The installer shall verify that signal heads flash in accordance with the Signal Plans.
2. Enable Simultaneous Gap-Out for all phases.
3. Program phase 6 for Variable Initial and Gap Reduction.
4. Program phase 6 for Start Up In Green.
5. Program phase 6 for Yellow Flash.
6. The cabinet and controller are part of the Gastonia City Signal System.

SIGNAL HEAD HOOK-UP CHART

| LOAD SWITCH NO. | S1 | S2 | S3 | S4 | S5 | S6 | S7 | S8 | S9 | S10 | S11 | S12 |
|-----------------|----|----|-------|-----|-------|-------|----|----|-------|-----|-----|-------|
| CMU CHANNEL NO. | 1 | 2 | 13 | 3 | 4 | 14 | 5 | 6 | 15 | 7 | 8 | 16 |
| PHASE | 1 | 2 | 2 PED | 3 | 4 | 4 PED | 5 | 6 | 6 PED | 7 | 8 | 8 PED |
| SIGNAL HEAD NO. | NU | NU | NU | 31 | 32,33 | NU | NU | NU | 61,62 | NU | NU | NU |
| RED | | | | | 116 | | | | 134 | | | |
| YELLOW | | | | | | | | | 135 | | | |
| GREEN | | | | | | | | | 136 | | | |
| RED ARROW | | | | 116 | | | | | | | | |
| YELLOW ARROW | | | | 117 | 117 | | | | | | | |
| GREEN ARROW | | | | 118 | 118 | | | | | | | |
| | | | | | | | | | | | | |
| | | | | | | | | | | | | |

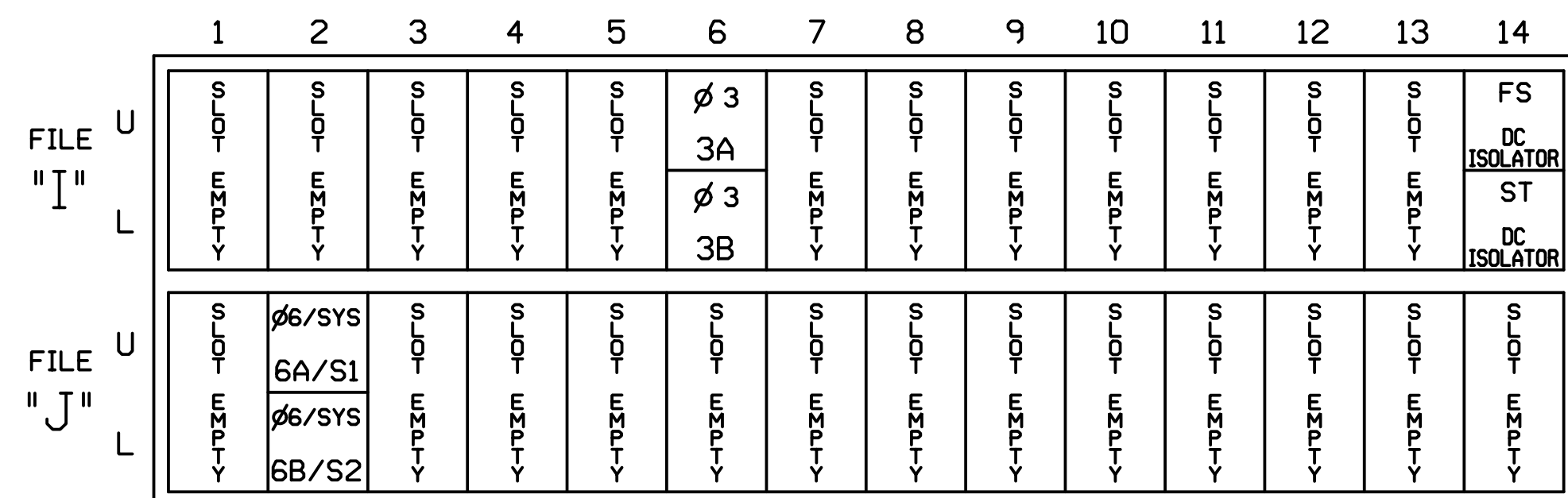
NU = Not Used

EQUIPMENT INFORMATION

CONTROLLER.....2070
 CABINET.....332
 SOFTWARE.....ECONOLITE OASIS
 CABINET MOUNT.....BASE
 OUTPUT FILE POSITIONS...12
 LOAD SWITCHES USED.....S4,S8
 PHASES USED.....3,6
 OVERLAPS.....NONE

INPUT FILE POSITION LAYOUT

(front view)



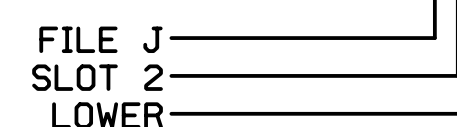
EX.: 1A, 2A, ETC. = LOOP NO.'S

FS = FLASH SENSE
 ST = STOP TIME

INPUT FILE CONNECTION & PROGRAMMING CHART

| LOOP NO. | LOOP TERMINAL | INPUT FILE POS. | PIN NO. | INPUT ASSIGNMENT NO. | DETECTOR NO. | NEMA PHASE | CALL | EXTEND | FULL TIME DELAY | STRETCH TIME | DELAY TIME |
|----------|---------------|-----------------|---------|----------------------|--------------|------------|------|--------|-----------------|--------------|------------|
| 3A | TB4-9,10 | I6U | 41 | 3 | 4 | 3 | Y | Y | | | |
| 3B | TB4-11,12 | I6L | 45 | 7 | 14 | 3 | Y | Y | | | 15 |
| 6A/S1 | TB3-5,6 | J2U | 40 | 2 | 6 | 6/SYS | Y | Y | | | |
| 6B/S2 | TB3-7,8 | J2L | 44 | 6 | 16 | 6/SYS | Y | Y | | | |

INPUT FILE POSITION LEGEND: J2L



THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 12-0023T4
 DESIGNED: September 2016
 SEALED: 11-08-2016
 REVISED:

Temporary Signal
 Phase 2, Step 1

**DOCUMENT NOT CONSIDERED FINAL
 UNLESS ALL SIGNATURES COMPLETED**

ELECTRICAL AND PROGRAMMING DETAILS FOR:

US 321 (N. Chester Street)
 at
 I-85 Southbound Ramp

Division 12 Gaston Co. Gastonia

PLAN DATE: September 2016 REVIEWED BY: T.R. Terrell
 PREPARED BY: J.A. Wagner REVIEWED BY: N.R. Simmons

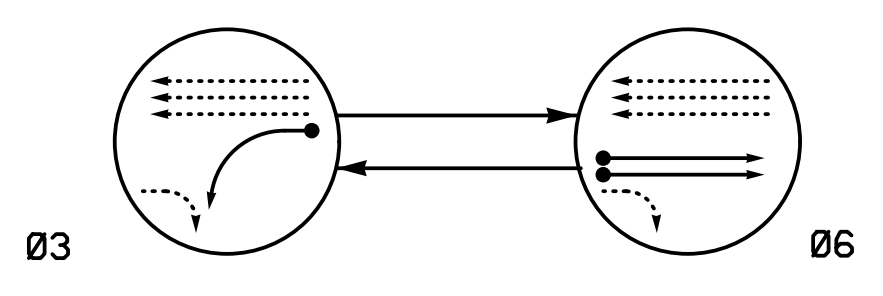
| REVISIONS | INIT. | DATE |
|-----------|-------|------|
| | | |

SEAL

11/8/2016
 DATE

SIG. INVENTORY NO. 12-0023T4

PHASING DIAGRAM



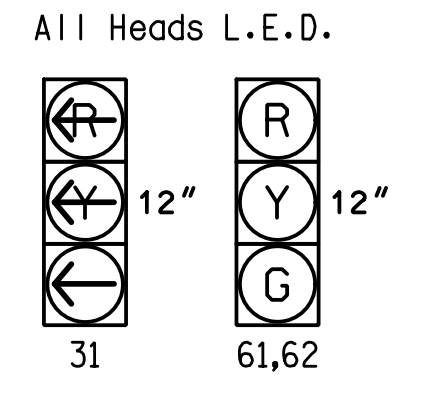
PHASING DIAGRAM DETECTION LEGEND

- ◄● DETECTED MOVEMENT
- ◄ UNDETECTED MOVEMENT (OVERLAP)
- ◄..... UNSIGNALIZED MOVEMENT
- ◄- - - PEDESTRIAN MOVEMENT

TABLE OF OPERATION

| SIGNAL FACE | PHASE | | |
|-------------|-------|-----|-------|
| | Ø 3 | Ø 6 | FLASH |
| 31 | — | R | R |
| 61,62 | R | G | Y |

SIGNAL FACE I.D.



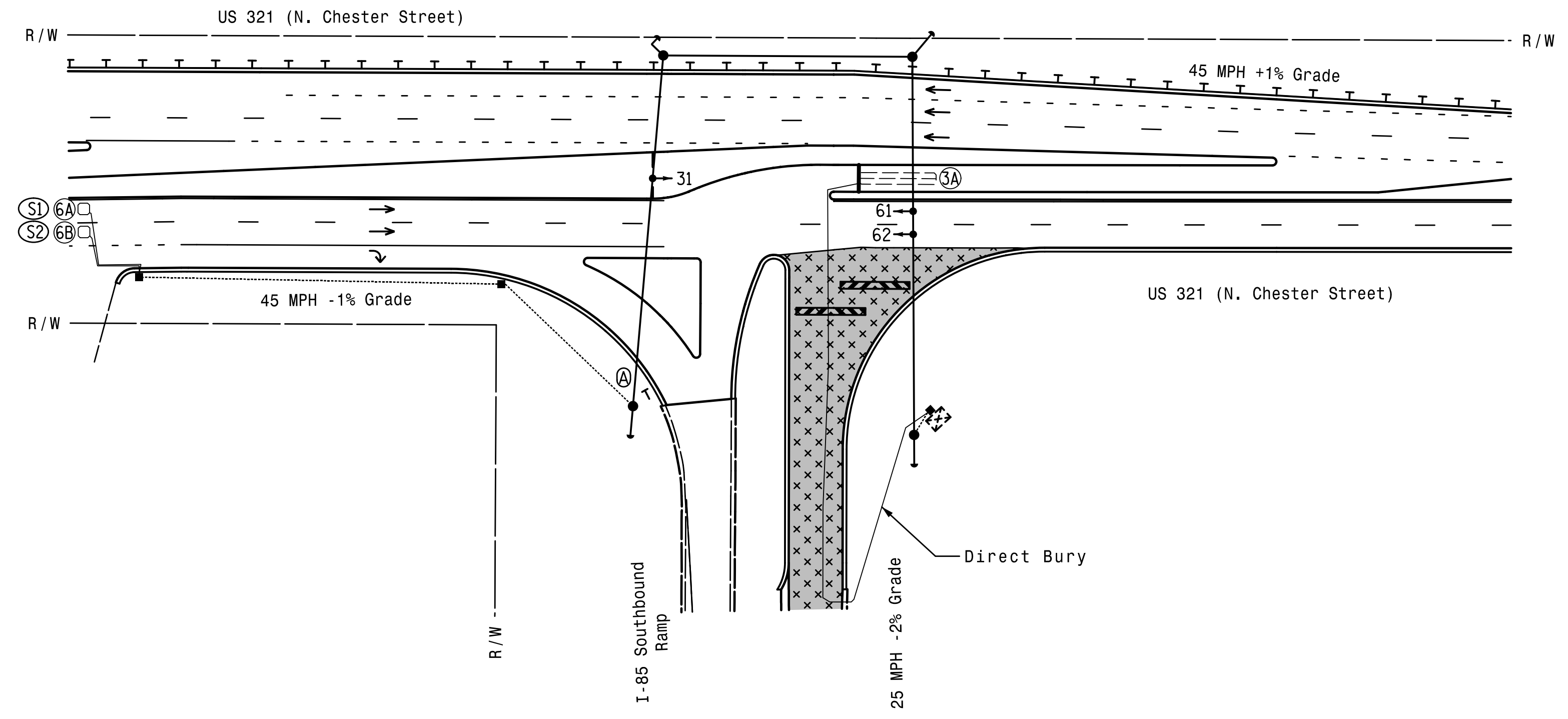
OASIS 2070 LOOP & DETECTOR INSTALLATION CHART

| LOOP | INDUCTIVE LOOPS | | | | DETECTOR PROGRAMMING | | | | | | | |
|-------|-----------------|----------------------------|-------|----------|----------------------|---------|-----------|-----------------|--------------|------------|-------------|----------|
| | SIZE (FT) | DISTANCE FROM STOPBAR (FT) | TURNS | NEW LOOP | PHASE | CALLING | EXTENSION | FULL TIME DELAY | STRETCH TIME | DELAY TIME | SYSTEM LOOP | NEW CARD |
| 3A | 6X40 | 0 | 2-4-2 | - | 3 | Y | Y | - | - | - | - | - |
| 6A/S1 | 6X6 | 300 | 6 | Y | 6 | Y | Y | - | - | - | Y | - |
| 6B/S2 | 6X6 | 300 | 6 | Y | 6 | Y | Y | - | - | - | Y | - |

2 Phase Fully Actuated (Gastonia City Signal System)

NOTES

- Refer to "Roadway Standard Drawings NCDOT" dated January 2012 and "Standard Specifications for Roads and Structures" dated January 2012.
- Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
- Set all detector units to presence mode.
- Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.
- Signal System data: Controller Asset #0023.



OASIS 2070 TIMING CHART

| FEATURE | PHASE | |
|-------------------------|-------|------------|
| | 3 | 6 |
| Min Green 1 * | 7 | 12 |
| Extension 1 * | 2.0 | 6.0 |
| Max Green 1 * | 20 | 90 |
| Yellow Clearance | 3.0 | 4.6 |
| Red Clearance | 2.4 | 1.3 |
| Red Revert | 2.0 | 2.0 |
| Walk 1 * | - | - |
| Don't Walk 1 | - | - |
| Seconds Per Actuation * | - | 1.5 |
| Max Variable Initial * | - | 34 |
| Time Before Reduction * | - | 15 |
| Time To Reduce * | - | 30 |
| Minimum Gap | - | 3.0 |
| Recall Mode | - | MIN RECALL |
| Vehicle Call Memory | - | YELLOW |
| Dual Entry | - | - |
| Simultaneous Gap | ON | ON |

* These values may be field adjusted. Do not adjust Min Green and Extension times for phase 6 lower than what is shown. Min Green for all other phases should not be lower than 4 seconds.

LEGEND

- | PROPOSED | EXISTING |
|--|--|
| ○→ Traffic Signal Head | ●→ Traffic Signal Head |
| ◐→ Modified Signal Head | N/A |
| ⊥ Sign | ⊥ Sign |
| ⊥ Pedestrian Signal Head With Push Button & Sign | ⊥ Pedestrian Signal Head With Push Button & Sign |
| ○ Signal Pole with Guy | ● Signal Pole with Guy |
| ○ Signal Pole with Sidewalk Guy | ● Signal Pole with Sidewalk Guy |
| ⊠ Inductive Loop Detector | ⊠ Inductive Loop Detector |
| ⊠ Controller & Cabinet | ⊠ Controller & Cabinet |
| ⊠ Junction Box | ⊠ Junction Box |
| --- 2-in Underground Conduit | --- 2-in Underground Conduit |
| N/A Right of Way | --- Right of Way |
| N/A Directional Arrow | → Directional Arrow |
| N/A Guardrail | ⊥ Guardrail |
| ⊠ "YIELD" Sign (R1-2) | ⊠ "YIELD" Sign (R1-2) |
| █ Construction Zone | N/A |
| ▨ Construction Zone Barricade | N/A |

Temporary Signal Phase 2, Step 2

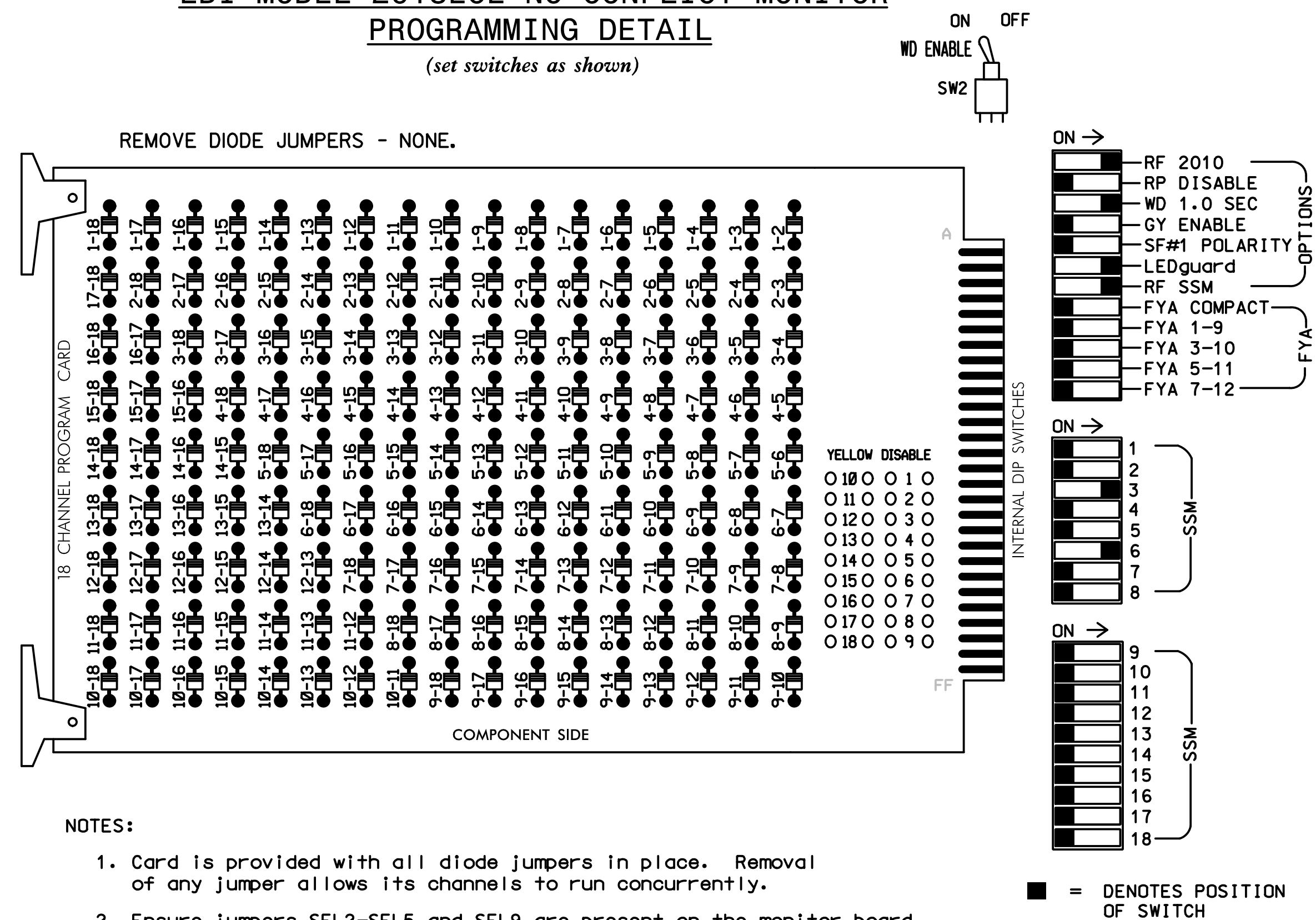
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

| | | | |
|--|--|---|------------------|
| | US 321 (N. Chester Street) at I-85 Southbound Ramp | | |
| | Division 12 Gaston Co. Gastonia | PLAN DATE: September 2016 REVIEWED BY: T.R. Terrell | |
| SCALE: 1"=50' | REVISIONS: | INITI: | DATE: |
| Documented by: <i>Natasha R. Simmons</i> 11/8/2016 | | | SIGNATURE: DATE: |
| SIG. INVENTORY NO. 12-0023T5 | | | |

HNTB HNTB NORTH CAROLINA, P.C.
 343 E. Six Forks Road, Suite 200
 Raleigh, North Carolina 27609
 NC License No: C-1554
 (919) 546-8997

EDI MODEL 2018ECL-NC CONFLICT MONITOR PROGRAMMING DETAIL

(set switches as shown)



NOTES:

1. Card is provided with all diode jumpers in place. Removal of any jumper allows its channels to run concurrently.
2. Ensure jumpers SEL2-SEL5 and SEL9 are present on the monitor board.
3. Ensure that Red Enable is active at all times during normal operation.
4. Connect serial cable from conflict monitor to comm. port 1 of 2070 controller. Ensure conflict monitor communicates with 2070.

NOTES

1. To prevent "flash-conflict" problems, insert red flash program blocks for all unused vehicle load switches in the output file. The installer shall verify that signal heads flash in accordance with the Signal Plans.
2. Enable Simultaneous Gap-Out for all phases.
3. Program phase 6 for Variable Initial and Gap Reduction.
4. Program phase 6 for Start Up In Green.
5. Program phase 6 for Yellow Flash.
6. The cabinet and controller are part of the Gastonia City Signal System.

EQUIPMENT INFORMATION

CONTROLLER.....2070
 CABINET.....332
 SOFTWARE.....ECONOLITE OASIS
 CABINET MOUNT.....BASE
 OUTPUT FILE POSITIONS...12
 LOAD SWITCHES USED.....S4,S8
 PHASES USED.....3,6
 OVERLAPS.....NONE

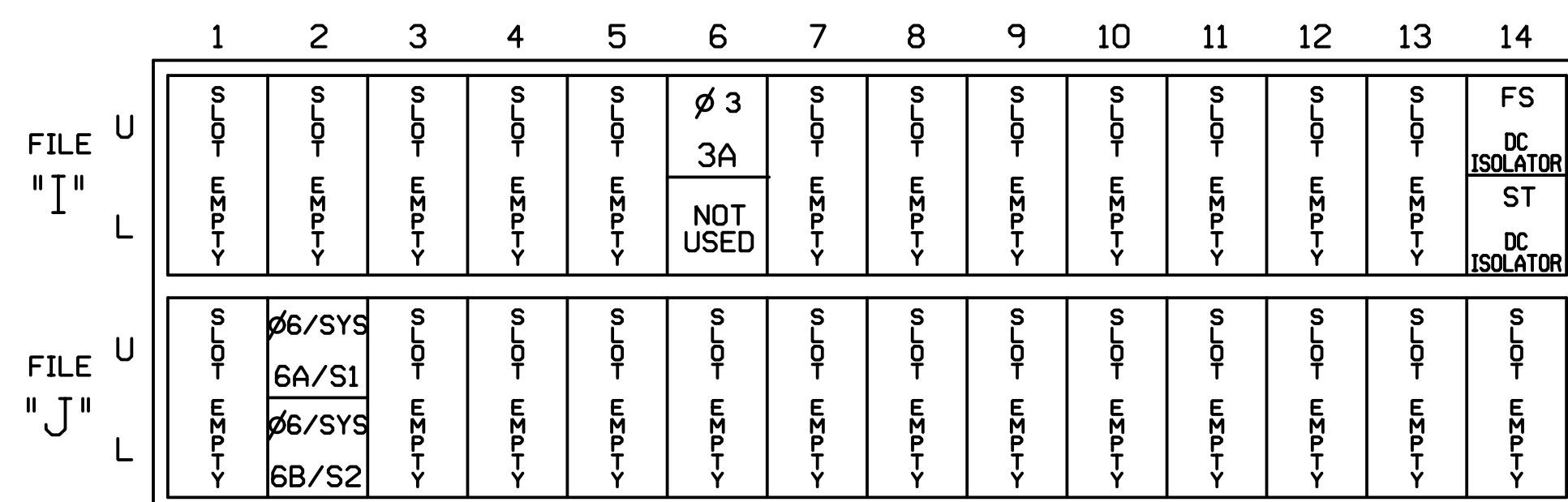
SIGNAL HEAD HOOK-UP CHART

| LOAD SWITCH NO. | S1 | S2 | S3 | S4 | S5 | S6 | S7 | S8 | S9 | S10 | S11 | S12 |
|-----------------|----|----|-------|-----|----|-------|----|-------|-------|-----|-----|-------|
| CMU CHANNEL NO. | 1 | 2 | 13 | 3 | 4 | 14 | 5 | 6 | 15 | 7 | 8 | 16 |
| PHASE | 1 | 2 | 2 PED | 3 | 4 | 4 PED | 5 | 6 | 6 PED | 7 | 8 | 8 PED |
| SIGNAL HEAD NO. | NU | NU | NU | 31 | NU | NU | NU | 61,62 | NU | NU | NU | NU |
| RED | | | | | | | | 134 | | | | |
| YELLOW | | | | | | | | 135 | | | | |
| GREEN | | | | | | | | 136 | | | | |
| RED ARROW | | | | 116 | | | | | | | | |
| YELLOW ARROW | | | | 117 | | | | | | | | |
| GREEN ARROW | | | | 118 | | | | | | | | |
| Hand icon | | | | | | | | | | | | |
| Person icon | | | | | | | | | | | | |

NU = Not Used

INPUT FILE POSITION LAYOUT

(front view)



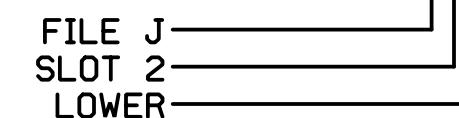
EX. : 1A, 2A, ETC. = LOOP NO.'S

FS = FLASH SENSE
 ST = STOP TIME

INPUT FILE CONNECTION & PROGRAMMING CHART

| LOOP NO. | LOOP TERMINAL | INPUT FILE POS. | PIN NO. | INPUT ASSIGNMENT NO. | DETECTOR NO. | NEMA PHASE | CALL | EXTEND | FULL TIME DELAY | STRETCH TIME | DELAY TIME |
|----------|---------------|-----------------|---------|----------------------|--------------|------------|------|--------|-----------------|--------------|------------|
| 3A | TB4-9,10 | I6U | 41 | 3 | 4 | 3 | Y | Y | | | |
| 6A/S1 | TB3-5,6 | J2U | 40 | 2 | 6 | 6/SYS | Y | Y | | | |
| 6B/S2 | TB3-7,8 | J2L | 44 | 6 | 16 | 6/SYS | Y | Y | | | |

INPUT FILE POSITION LEGEND: J2L



THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 12-0023T5
 DESIGNED: September 2016
 SEALED: 11-08-2016
 REVISED:

Temporary Signal
 Phase 2, Step 2

DOCUMENT NOT CONSIDERED FINAL
 UNLESS ALL SIGNATURES COMPLETED

ELECTRICAL AND PROGRAMMING DETAILS FOR:

Prepared for:
 Transportation Mobility and Safety Solutions
 STATE OF NORTH CAROLINA
 Signal Management Section

750 N. Greenfield Pkwy, Garner, NC 27529

US 321 (N. Chester Street)
 at
 I-85 Southbound Ramp

Division 12 Gaston Co. Gastonia

PLAN DATE: September 2016 REVIEWED BY: T.R. Terrell
 PREPARED BY: J.A. Wagner REVIEWED BY: N.R. Simmons

| REVISIONS | INIT. | DATE |
|-----------|-------|------|
| | | |

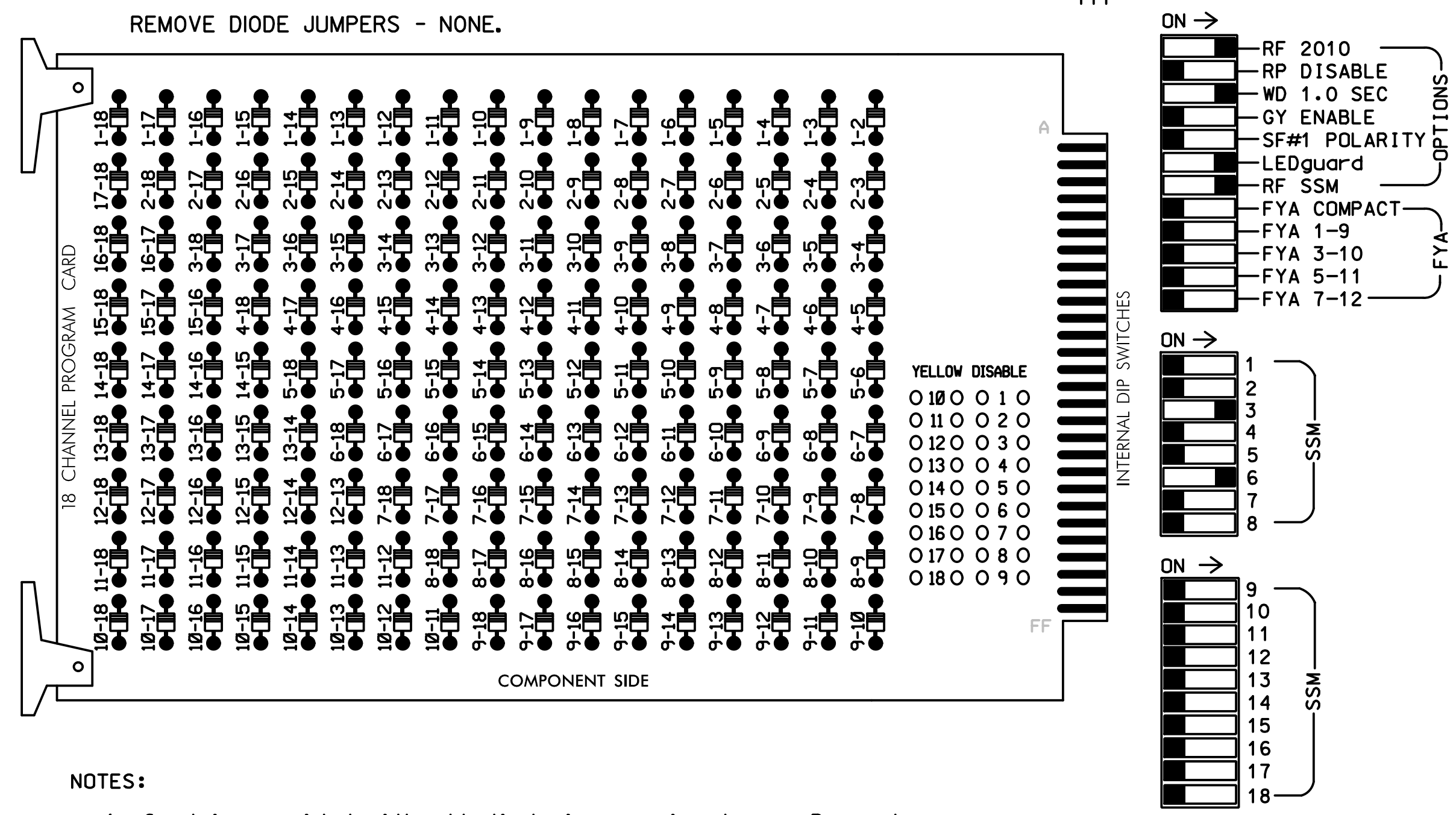
SEAL

DocuSigned by:
 Natasha R. Simmons
 11/8/2016

SIG. INVENTORY NO. 12-0023T5

EDI MODEL 2018ECL-NC CONFLICT MONITOR PROGRAMMING DETAIL

(set switches as shown)



- NOTES:
1. Card is provided with all diode jumpers in place. Removal of any jumper allows its channels to run concurrently.
 2. Ensure jumpers SEL2-SEL5 and SEL9 are present on the monitor board.
 3. Ensure that Red Enable is active at all times during normal operation.
 4. Connect serial cable from conflict monitor to comm. port 1 of 2070 controller. Ensure conflict monitor communicates with 2070.

■ = DENOTES POSITION OF SWITCH

NOTES

1. To prevent "flash-conflict" problems, insert red flash program blocks for all unused vehicle load switches in the output file. The installer shall verify that signal heads flash in accordance with the Signal Plans.
2. Enable Simultaneous Gap-Out for all phases.
3. Program phase 6 for Variable Initial and Gap Reduction.
4. Program phase 6 for Start Up In Green.
5. Program phase 6 for Yellow Flash.
6. The cabinet and controller are part of the Gastonia City Signal System.

EQUIPMENT INFORMATION

CONTROLLER.....2070
 CABINET.....332
 SOFTWARE.....ECONOLITE OASIS
 CABINET MOUNT.....BASE
 OUTPUT FILE POSITIONS...12
 LOAD SWITCHES USED.....S4,S8
 PHASES USED.....3,6
 OVERLAPS.....NONE

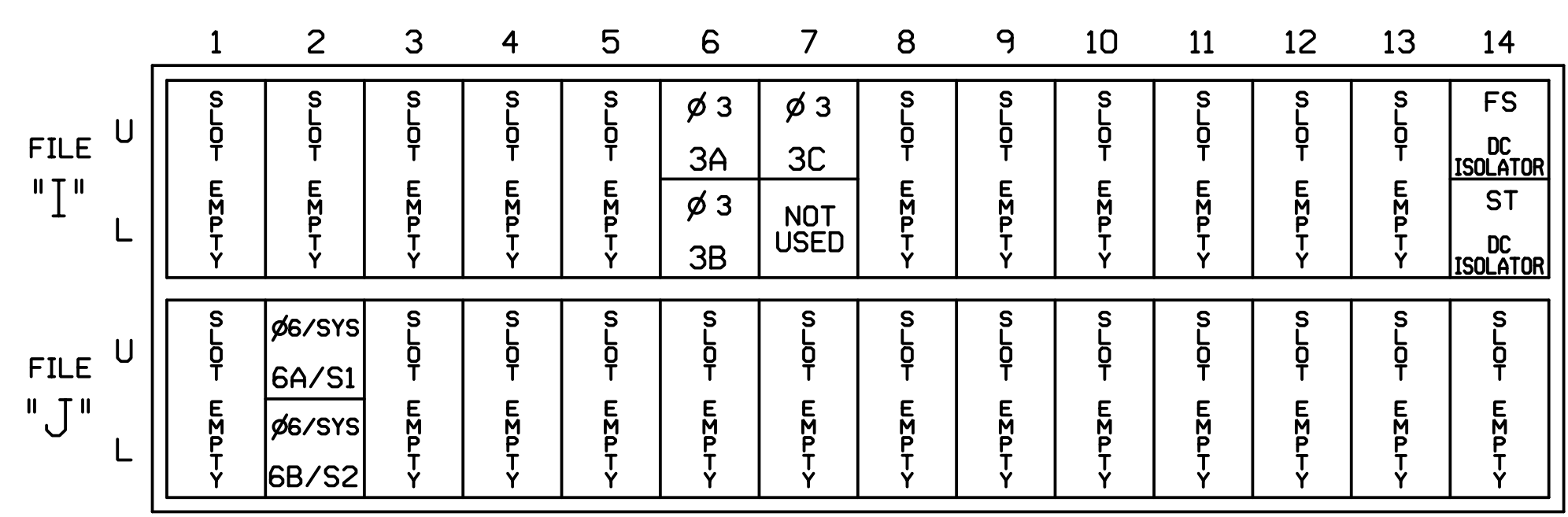
SIGNAL HEAD HOOK-UP CHART

| LOAD SWITCH NO. | S1 | S2 | S3 | S4 | S5 | S6 | S7 | S8 | S9 | S10 | S11 | S12 |
|---------------------|----|----|-------|-------|-------|-------|----|-----|-------|-----|-----|-------|
| CMU CHANNEL NO. | 1 | 2 | 13 | 3 | 4 | 14 | 5 | 6 | 15 | 7 | 8 | 16 |
| PHASE | 1 | 2 | 2 PED | 3 | 4 | 4 PED | 5 | 6 | 6 PED | 7 | 8 | 8 PED |
| SIGNAL HEAD NO. | NU | NU | NU | 31,32 | 33,34 | NU | NU | NU | 61,62 | NU | NU | NU |
| RED | | | | 116 | | | | 134 | | | | |
| YELLOW | | | | | | | | 135 | | | | |
| GREEN | | | | | | | | 136 | | | | |
| RED ARROW | | | | 116 | | | | | | | | |
| YELLOW ARROW | | | | 117 | 117 | | | | | | | |
| GREEN ARROW | | | | 118 | 118 | | | | | | | |
| Hand icon | | | | | | | | | | | | |
| Walking person icon | | | | | | | | | | | | |

NU = Not Used

INPUT FILE POSITION LAYOUT

(front view)



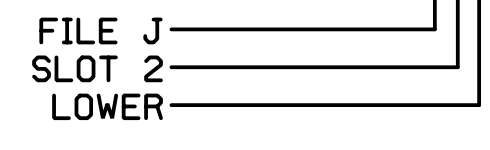
EX. : 1A, 2A, ETC. = LOOP NO.'S

FS = FLASH SENSE
 ST = STOP TIME
 PRE = PREEMPT

INPUT FILE CONNECTION & PROGRAMMING CHART

| LOOP NO. | LOOP TERMINAL | INPUT FILE POS. | PIN NO. | INPUT ASSIGNMENT NO. | DETECTOR NO. | NEMA PHASE | CALL | EXTEND | FULL TIME DELAY | STRETCH TIME | DELAY TIME |
|----------|---------------|-----------------|---------|----------------------|--------------|------------|------|--------|-----------------|--------------|------------|
| 3A | TB4-9,10 | I6U | 41 | 3 | 4 | 3 | Y | Y | | | |
| 3B | TB4-11,12 | I6L | 45 | 7 | 14 | 3 | Y | Y | | | 15 |
| 3C | TB6-1,2 | I7U | 65 | 27 | 34 | 3 | Y | Y | | | 15 |
| 6A/S1 | TB3-5,6 | J2U | 40 | 2 | 6 | 6/SYS | Y | Y | | | |
| 6B/S2 | TB3-7,8 | J2L | 44 | 6 | 16 | 6/SYS | Y | Y | | | |

INPUT FILE POSITION LEGEND: J2L



THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 12-0023
 DESIGNED: September 2016
 SEALED: 12-16-2016
 REVISED:

Signal Upgrade - Final Design DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

Prepared for

 HNTB
 750 N. Greenfield Pkwy, Garner, NC 27529

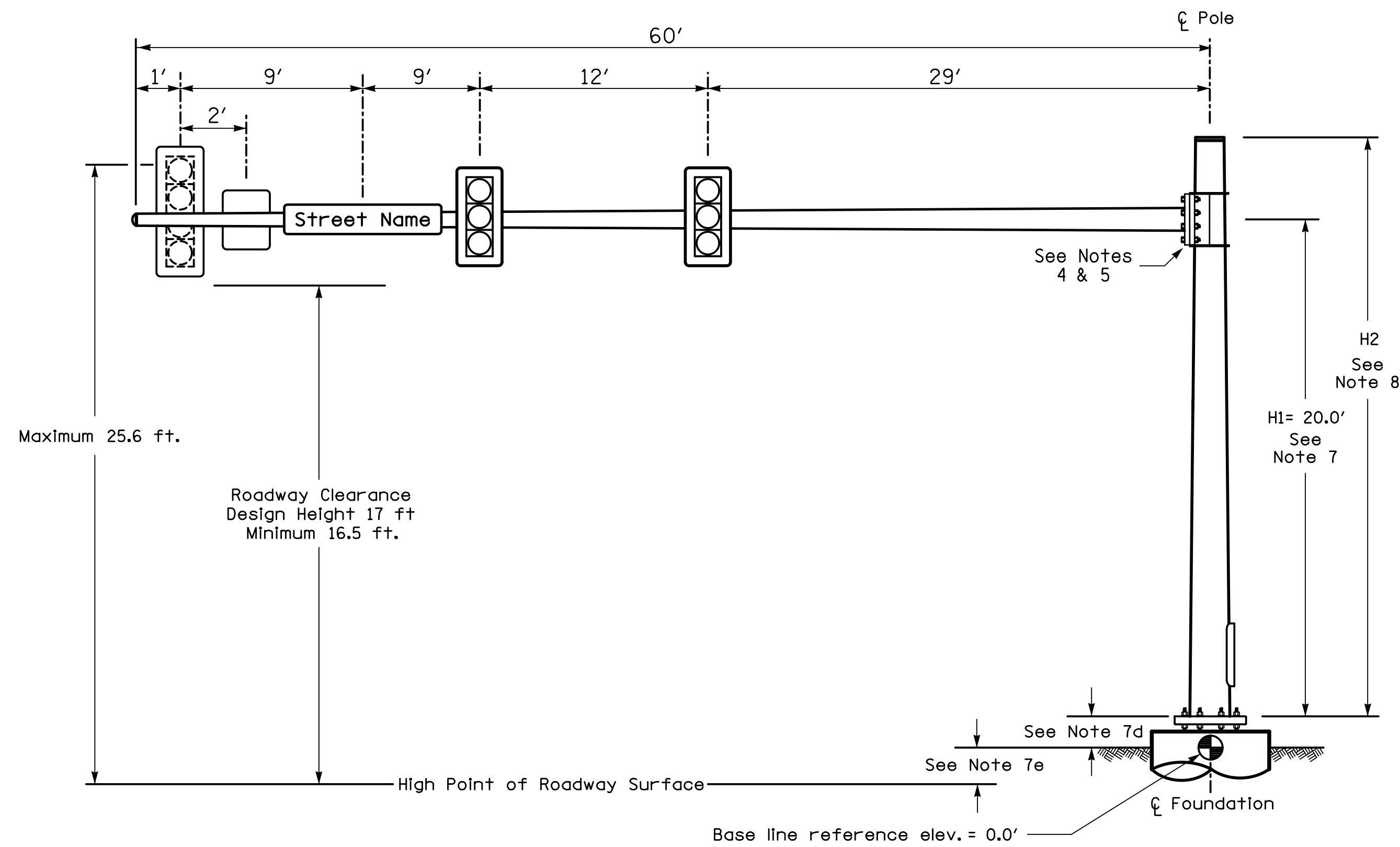
US 321 (N. Chester Street) at I-85 Southbound Ramp
 Division 12 Gaston Co. Gastonia
 PLAN DATE: September 2016 REVIEWED BY: T.R. Terrell
 PREPARED BY: J.A. Wagner REVIEWED BY: N.R. Simmons

| REVISIONS | INIT. | DATE |
|-----------|-------|------|
| | | |

SEAL

 SEAL 031464
 NATASHA R. SIMMONS
 12/16/2016
 SIGNATURE DATE
 SIG. INVENTORY NO. 12-0023

Design Loading for METAL POLE NO. 7



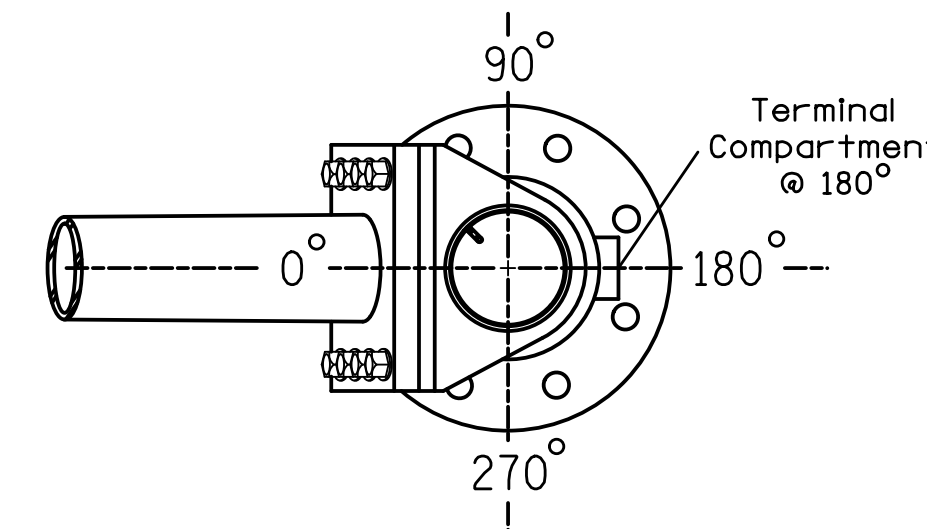
Elevation View

SPECIAL NOTE

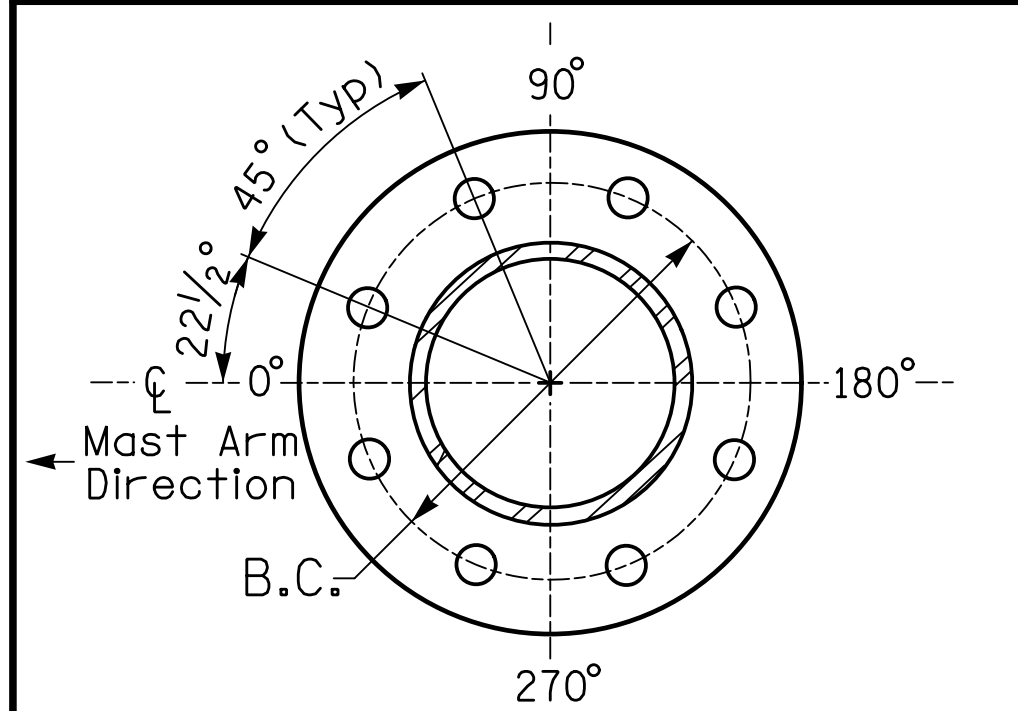
The contractor is responsible for verifying that the mast arm attachment height (H1) will provide the "Design Height" clearance from the roadway before submitting final shop drawings for approval. Verify elevation data below which was obtained by field measurement or from available project survey data.

Elevation Data for Mast Arm Attachment (H1)

| | | |
|---|-----------|--|
| Elevation Differences for: | Pole 7 | |
| Baseline reference point at Foundation @ ground level | 0.0 ft. | |
| Elevation difference at High point of roadway surface | -0.04 ft. | |
| Elevation difference at Edge of travelway or face of curb | 0.00 ft. | |

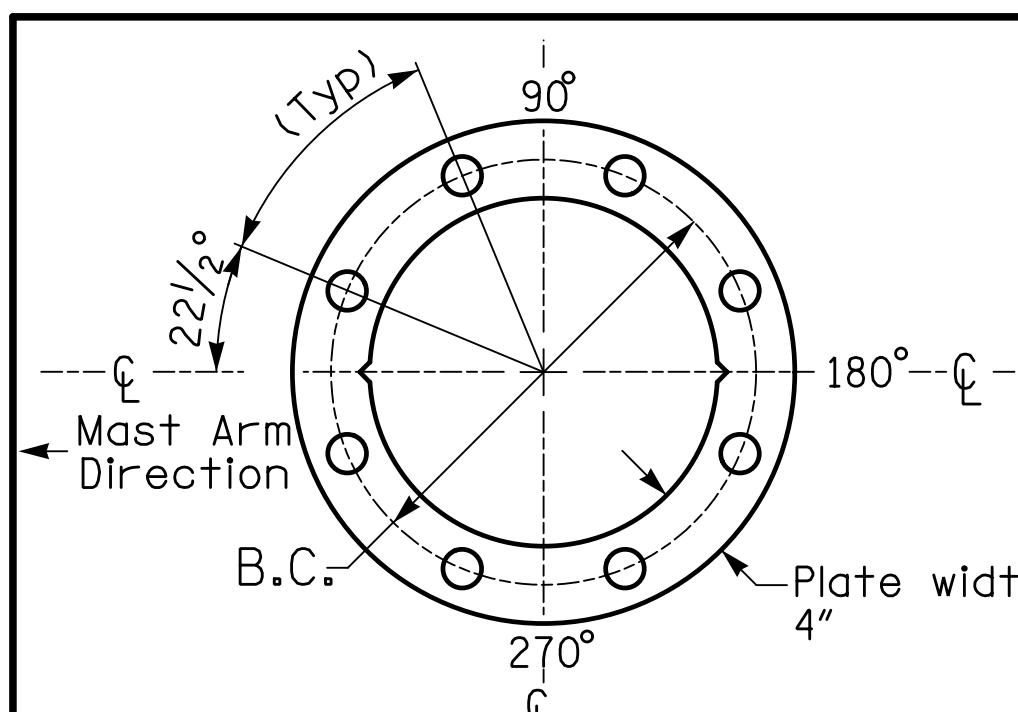


POLE RADIAL ORIENTATION



8 BOLT BASE PLATE DETAIL

See Note 6



BASE PLATE TEMPLATE & ANCHOR BOLT LOCK PLATE DETAIL
For 8 Bolt Base Plate

METAL POLE No. 7

| | |
|-----------------------|-----------|
| PROJECT REFERENCE NO. | SHEET NO. |
| I-5000 | Sig. 16.2 |

MAST ARM LOADING SCHEDULE

| LOADING SYMBOL | DESCRIPTION | AREA | SIZE | WEIGHT |
|----------------|---|-----------|-------------------------|--------|
| | RIGID MOUNTED SIGNAL HEAD 12"-4 SECTION-WITH BACKPLATE | 11.5 S.F. | 25.5" W X 66.0" L | 74 LBS |
| | RIGID MOUNTED SIGNAL HEAD 12"-3 SECTION-WITH BACKPLATE | 9.3 S.F. | 25.5" W X 52.5" L | 60 LBS |
| | SIGN RIGID MOUNTED | 5.0 S.F. | 24.0" W X 30.0" L | 11 LBS |
| | STREET NAME SIGN RIGID MOUNTED | 16.0 S.F. | 24.0" W X 96.0" L | 36 LBS |

NOTES

DESIGN REFERENCE MATERIAL

- Design the traffic signal structure and foundation in accordance with:
 - The 6th Edition 2013 AASHTO "Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals, including all of the latest interim revisions.
 - The 2012 NCDOT "Standard Specifications for Roads and Structures." The latest addenda to the specifications can be found in the traffic signal project special provisions.
 - The 2012 NCDOT Roadway Standard Drawings.
 - The traffic signal project plans and special provisions.
 - The NCDOT "Metal Pole Standards" located at the following NCDOT website: <https://connect.ncdot.gov/resources/safety/Pages/ITS-Design-Resources.aspx>

DESIGN REQUIREMENTS

- Design the traffic signal structure using the loading conditions shown in the elevation views. These are anticipated worst case "design loads" and may not represent the actual loads that will be applied at the time of the installation. The contractor should refer to the traffic signal plans for the actual loads that will be applied at the time of the installation.
- Design all signal supports using stress ratios that do not exceed 0.9.
- The camber design for the mast arm deflection should provide an appearance of a low pitched arch where the tip or the free end of the mast arm does not deflect below horizontal when fully loaded.
- A clamp-type bolted mast arm-to-pole connection may be used instead of the welded ring stiffened box connection shown as long as the connection meets all of the design requirements.
- Design base plate with 8 anchor bolt holes. Provide 2 inch x 60 inch anchor bolts.
- The mast arm attachment height (H1) shown is based on the following design assumptions:
 - Mast arm slope and deflection are not considered in determining the arm attachment height as they are assumed to offset each other.
 - Signal heads are rigidly mounted and vertically centered on the mast arm.
 - The roadway clearance height for design is as shown in the elevation views.
 - The top of the pole base plate is 0.75 feet above the ground elevation.
 - Refer to the Elevation Data Chart for the elevation differences between the proposed foundation ground level and the high point of the roadway.
- The pole manufacturer will determine the total height (H2) of each pole using the greater of the following:
 - Mast arm attachment height (H1) plus 2 feet, or
 - H1 plus 1/2 of the total height of the mast arm attachment assembly plus 1 foot.
- If pole location adjustments are required, the contractor must gain approval from the Engineer as this may affect the mast arm lengths and arm attachment heights. The contractor may contact the Signal Design Section Senior Structural Engineer for assistance at (919) 773-2800.
- The contractor is responsible for verifying that the mast arm length shown will allow proper positioning of the signal heads over the roadway.
- The contractor is responsible for providing soil penetration testing data (SPT) to the pole manufacturer so site specific foundations can be designed.

All metal poles and arms should be black in color as specified in the project special provisions.

NCDOT Wind Zone 4 (90 mph)

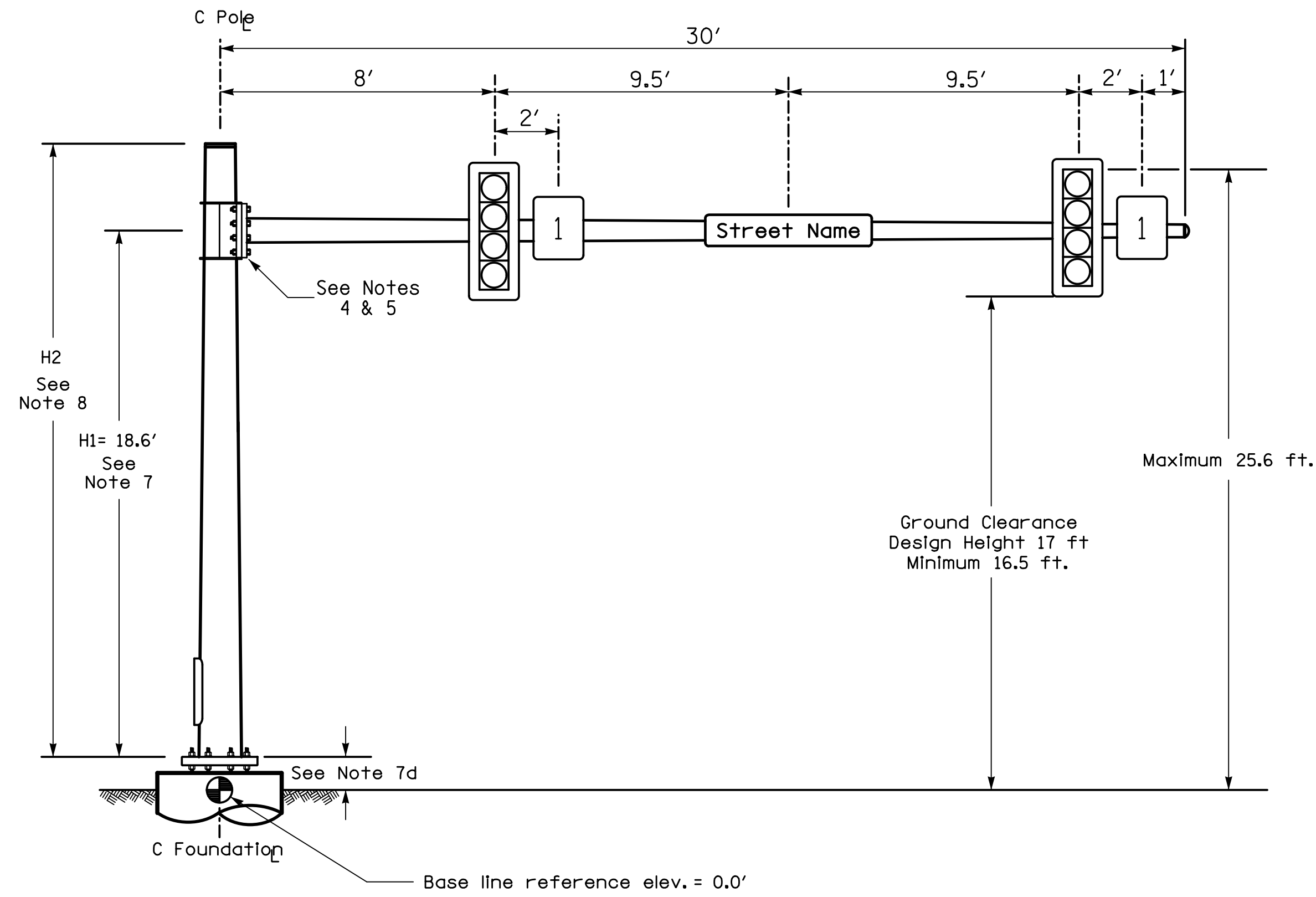
DOCUMENT NOT CONSIDERED FINAL
UNLESS ALL SIGNATURES COMPLETED

| | | |
|---|---|---|
| Prepared For NORTH CAROLINA DEPARTMENT OF TRANSPORTATION Signal Design Section 750 N. Greenfield Pkwy, Garner, NC 27529 | US 321 (N. Chester Street) at I-85 Southbound Ramp | SEAL NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 031464 NATASHA R. SIMMONS |
| | Division 12 Gaston Co. Gastonia PLAN DATE: September 2016 REVIEWED BY: A.D. Klinksiek PREPARED BY: T.R. Terrell REVIEWED BY: N.R. Simmons | |

HNTB HNTB NORTH CAROLINA, P.C.
 343 E. Six Forks Road, Suite 200
 Raleigh, North Carolina 27609
 NC License No: C-1554
 (919) 546-8997

DocuSigned by:
 12/16/2016
 SIGNATURE DATE
 SIG. INVENTORY NO. 12-0023

Design Loading for METAL POLE NO. 8



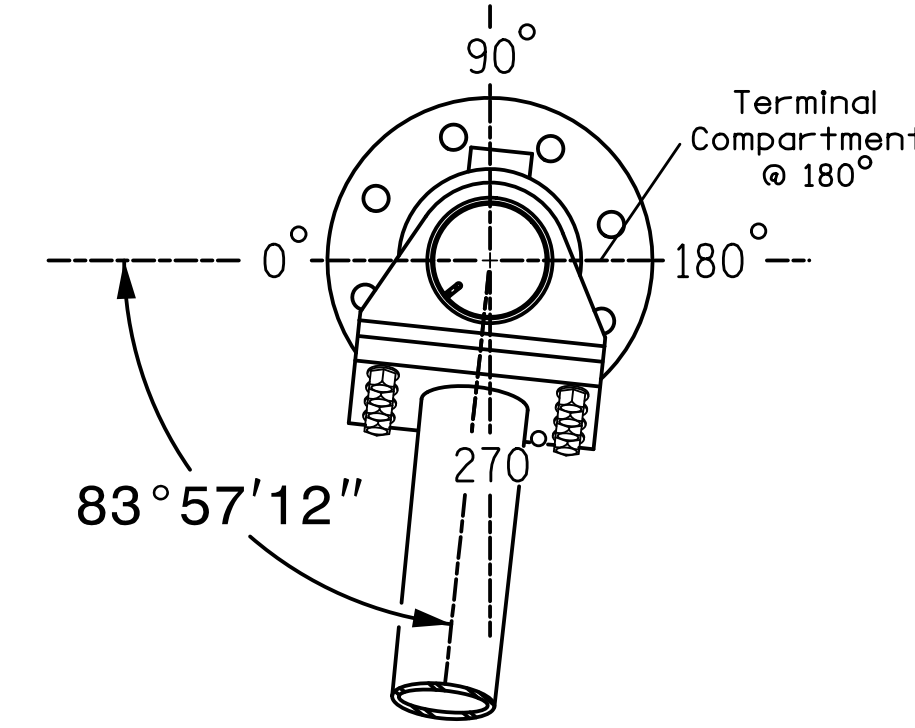
Elevation View @ 270°

SPECIAL NOTE

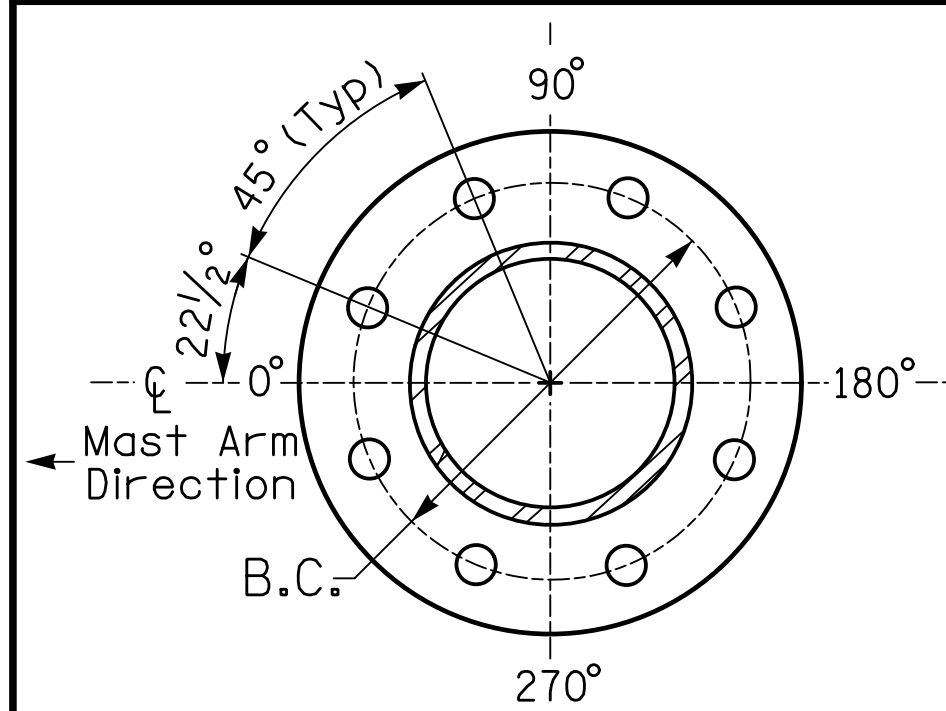
The contractor is responsible for verifying that the mast arm attachment height (H1) will provide the "Design Height" clearance from the roadway before submitting final shop drawings for approval. Verify elevation data below which was obtained by field measurement or from available project survey data.

Elevation Data for Mast Arm Attachment (H1)

| Elevation Differences for: | Pole 8 | |
|---|----------|--|
| Baseline reference point at Foundation @ ground level | 0.0 ft. | |
| Elevation difference at High point of roadway surface | +0.0 ft. | |
| Elevation difference at Edge of travelway or face of curb | +0.0 ft. | |

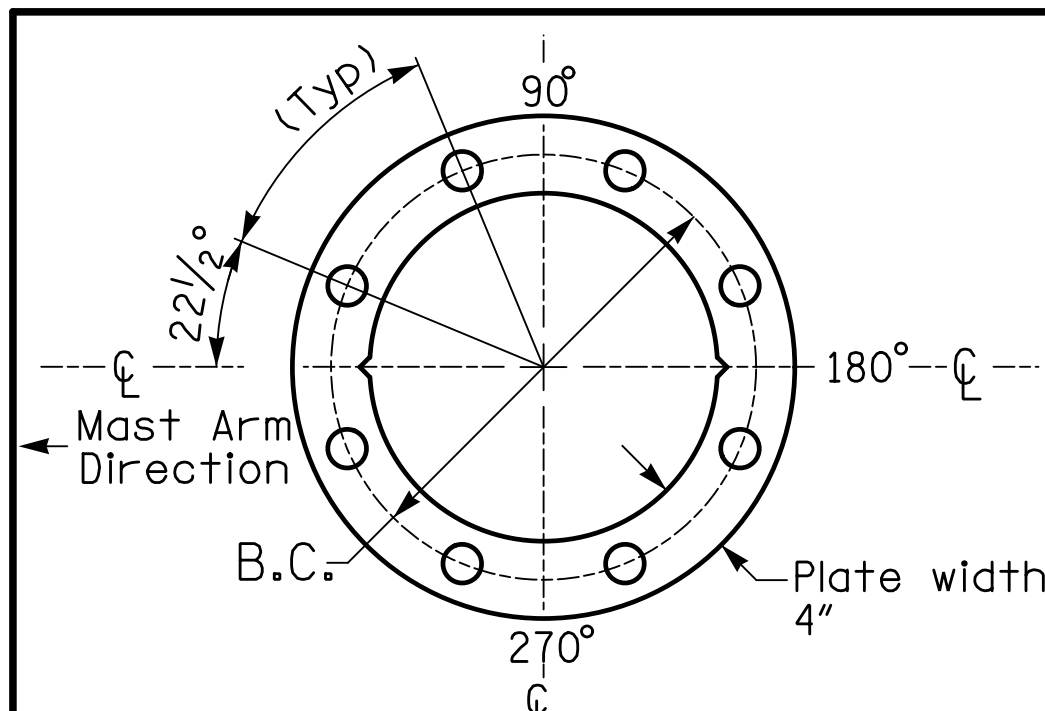


POLE RADIAL ORIENTATION



8 BOLT BASE PLATE DETAIL

See Note 6



BASE PLATE TEMPLATE & ANCHOR BOLT LOCK PLATE DETAIL For 8 Bolt Base Plate

HNTB HNTB NORTH CAROLINA, P.C.
343 E. Six Forks Road, Suite 200
Raleigh, North Carolina 27609
NC License No: C-1554
(919) 546-8997

METAL POLE No. 8

| PROJECT REFERENCE NO. | SHEET NO. |
|-----------------------|-----------|
| I-5000 | Fig. 16.3 |

MAST ARM LOADING SCHEDULE

| LOADING SYMBOL | DESCRIPTION | AREA | SIZE | WEIGHT |
|----------------|---|-----------|-------------------------|--------|
| | RIGID MOUNTED SIGNAL HEAD 12"-3 SECTION-WITH BACKPLATE | 9.3 S.F. | 25.5" W X 52.5" L | 60 LBS |
| 1 | SIGN RIGID MOUNTED | 5.0 S.F. | 24.0" W X 30.0" L | 11 LBS |
| | STREET NAME SIGN RIGID MOUNTED | 16.0 S.F. | 24.0" W X 96.0" L | 36 LBS |

NOTES

DESIGN REFERENCE MATERIAL

- Design the traffic signal structure and foundation in accordance with:
 - The 6th Edition 2013 AASHTO "Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals, including all of the latest interim revisions.
 - The 2012 NCDOT "Standard Specifications for Roads and Structures." The latest addenda to the specifications can be found in the traffic signal project special provisions.
 - The 2012 NCDOT Roadway Standard Drawings.
 - The traffic signal project plans and special provisions.
 - The NCDOT "Metal Pole Standards" located at the following NCDOT website: <https://connect.ncdot.gov/resources/safety/Pages/ITS-Design-Resources.aspx>

DESIGN REQUIREMENTS

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- Design all signal supports using stress ratios that do not exceed 0.9.
- The camber design for the mast arm deflection should provide an appearance of a low pitched arch where the tip or the free end of the mast arm does not deflect below horizontal when fully loaded.
- A clamp-type bolted mast arm-to-pole connection may be used instead of the welded ring stiffened box connection shown as long as the connection meets all of the design requirements.
- Design base plate with 8 anchor bolt holes. Provide 2 inch x 60 inch anchor bolts.
- The mast arm attachment height (H1) shown is based on the following design assumptions:
 - Mast arm slope and deflection are not considered in determining the arm attachment height as they are assumed to offset each other.
 - Signal heads are rigidly mounted and vertically centered on the mast arm.
 - The roadway clearance height for design is as shown in the elevation views.
 - The top of the pole base plate is 0.75 feet above the ground elevation.
 - Refer to the Elevation Data Chart for the elevation differences between the proposed foundation ground level and the high point of the roadway.
- The pole manufacturer will determine the total height (H2) of each pole using the greater of the following:
 - Mast arm attachment height (H1) plus 2 feet, or
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- If pole location adjustments are required, the contractor must gain approval from the Engineer as this may affect the mast arm lengths and arm attachment heights. The contractor may contact the Signal Design Section Senior Structural Engineer for assistance at (919) 773-2800.
- The contractor is responsible for verifying that the mast arm length shown will allow proper positioning of the signal heads over the roadway.
- The contractor is responsible for providing soil penetration testing data (SPT) to the pole manufacturer so site specific foundations can be designed.

All metal poles and arms should be black in color as specified in the project special provisions.

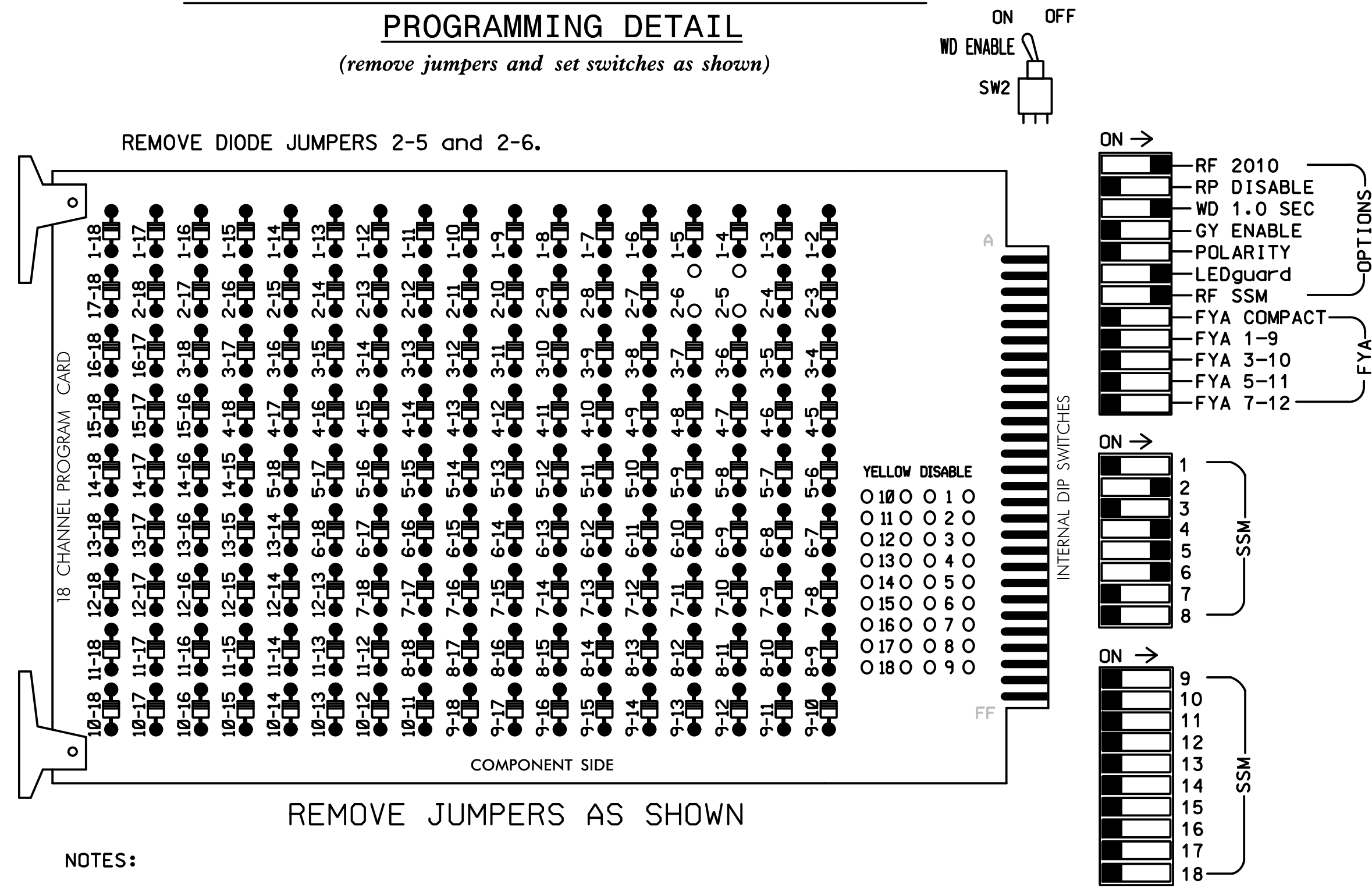
NCDOT Wind Zone 4 (90 mph)

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

| | | |
|--|---|--|
| Prepared For NORTH CAROLINA DEPARTMENT OF TRANSPORTATION Signal Design Section 750 N. Greenfield Place, Garner, NC 27525 | US 321 (N. Chester Street) at I-85 Southbound Ramp Division 12 Gaston Co. Gastonia PLAN DATE: September 2016 REVIEWED BY: A.D. Klinksiek PREPARED BY: T.R. Terrell REVIEWED BY: N.R. Simmons | SEAL W. TISHA R. SIMMONS ENGINEER SEAL 031464 |
| | SCALE 0 N/A NONE | REVISIONS INIT. DATE |

EDI MODEL 2018ECL-NC CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)



NOTES

- To prevent "flash-conflict" problems, insert red flash program blocks for all unused vehicle load switches in the output file. The installer shall verify that signal heads flash in accordance with the Signal Plans.
- Enable simultaneous gap-out for all phases.
- Program phases 2 and 6 for Variable Initial and Gap Reduction.
- Program phases 2 and 6 for Start Up in Green.
- Program phases 2 and 6 for Yellow Flash.
- The cabinet and controller are part of the Gastonia Signal System.

SIGNAL HEAD HOOK-UP CHART

| LOAD SWITCH NO. | S1 | S2 | S3 | S4 | S5 | S6 | S7 | S8 | S9 | S10 | S11 | S12 |
|-----------------|----|-------|-------|----|-------|-------|----|-------|-------|-----|-----|-------|
| CMU CHANNEL NO. | 1 | 2 | 13 | 3 | 4 | 14 | 5 | 6 | 15 | 7 | 8 | 16 |
| PHASE | 1 | 2 | 2 PED | 3 | 4 | 4 PED | 5 | 6 | 6 PED | 7 | 8 | 8 PED |
| SIGNAL HEAD NO. | NU | 21,22 | NU | NU | 41,42 | NU | 51 | 61,62 | NU | NU | NU | NU |
| RED | | 128 | | | | | | 134 | | | | |
| YELLOW | | 129 | | | | | | 135 | | | | |
| GREEN | | 130 | | | | | | 136 | | | | |
| RED ARROW | | | | | 101 | | | 131 | | | | |
| YELLOW ARROW | | | | | 102 | | | 132 | | | | |
| GREEN ARROW | | | | | 103 | | | 133 | | | | |
| Hand icon | | | | | | | | | | | | |
| Person icon | | | | | | | | | | | | |

NU = Not Used

EQUIPMENT INFORMATION

CONTROLLER.....2070
 CABINET.....332
 SOFTWARE.....ECONOLITE OASIS
 CABINET MOUNT.....BASE
 OUTPUT FILE POSITIONS...12
 LOAD SWITCHES USED.....S2,S5,S7,S8
 PHASES USED.....2,4,5,6
 OVERLAPS.....NONE

INPUT FILE POSITION LAYOUT

(front view)

| FILE | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 |
|------|--------|----------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|-------------|
| U | ∅2/SYS | ∅2/S1 | ∅2/SYS | ∅2/SYS | ∅2/SYS | ∅4 | ∅2/SYS | ∅2/SYS | ∅2/SYS | ∅2/SYS | ∅2/SYS | ∅2/SYS | ∅2/SYS | FS |
| I | ∅2/SYS | 2A/S1 | ∅2/SYS | ∅2/SYS | ∅2/SYS | 4A | ∅2/SYS | ∅2/SYS | ∅2/SYS | ∅2/SYS | ∅2/SYS | ∅2/SYS | ∅2/SYS | DC ISOLATOR |
| L | ∅2/SYS | ∅2/SYS | ∅2/SYS | ∅2/SYS | ∅2/SYS | ∅4 | ∅2/SYS | ∅2/SYS | ∅2/SYS | ∅2/SYS | ∅2/SYS | ∅2/SYS | ∅2/SYS | ST |
| U | ∅6/SYS | ∅6/S3 | ∅6/SYS | ∅6/SYS | ∅6/SYS | ∅6/SYS | ∅6/SYS | ∅6/SYS | ∅6/SYS | ∅6/SYS | ∅6/SYS | ∅6/SYS | ∅6/SYS | DC ISOLATOR |
| J | ∅6/SYS | 5A | ∅6/SYS | ∅6/SYS | ∅6/SYS | ∅6/SYS | ∅6/SYS | ∅6/SYS | ∅6/SYS | ∅6/SYS | ∅6/SYS | ∅6/SYS | ∅6/SYS | |
| L | ∅6/SYS | NOT USED | ∅6/SYS | ∅6/SYS | ∅6/SYS | ∅6/SYS | ∅6/SYS | ∅6/SYS | ∅6/SYS | ∅6/SYS | ∅6/SYS | ∅6/SYS | ∅6/SYS | |
| | ∅6/S4 | | ∅6/SYS | ∅6/SYS | ∅6/SYS | ∅6/SYS | ∅6/SYS | ∅6/SYS | ∅6/SYS | ∅6/SYS | ∅6/SYS | ∅6/SYS | ∅6/SYS | |

EX. : 1A, 2A, ETC. = LOOP NO.'S

FS = FLASH SENSE
 ST = STOP TIME

INPUT FILE CONNECTION & PROGRAMMING CHART

| LOOP NO. | LOOP TERMINAL | INPUT FILE POS. | PIN NO. | INPUT ASSIGNMENT NO. | DETECTOR NO. | NEMA PHASE | CALL | EXTEND | FULL TIME DELAY | STRETCH TIME | DELAY TIME |
|----------|---------------|-----------------|---------|----------------------|--------------|------------|------|--------|-----------------|--------------|------------|
| 2A/S1 | TB2-5,6 | I2U | 39 | 1 | 2 | 2/SYS | Y | Y | | | |
| 2B/S2 | TB2-7,8 | I2L | 43 | 5 | 12 | 2/SYS | Y | Y | | | |
| 4A | TB4-9,10 | I6U | 41 | 3 | 4 | 4 | Y | Y | | | |
| 4B | TB4-11,12 | I6L | 45 | 7 | 14 | 4 | Y | Y | | | |
| 5A | TB3-1,2 | J1U | 55 | 17 | 5 | 5 | Y | Y | | | |
| 6A/S3 | TB3-5,6 | J2U | 40 | 2 | 6 | 6/SYS | Y | Y | | | |
| 6A/S4 | TB3-7,8 | J2L | 44 | 6 | 16 | 6/SYS | Y | Y | | | |

INPUT FILE POSITION LEGEND: J2L

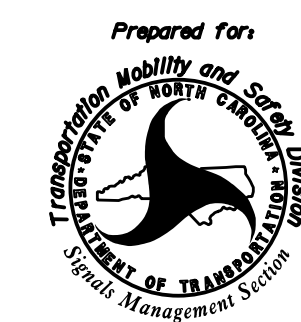


THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 12-0162T1
 DESIGNED: September 2016
 SEALED: 11-08-2016
 REVISED:

Temporary Signal
 Phase 1, Step 1
 Phase 1, Step 2

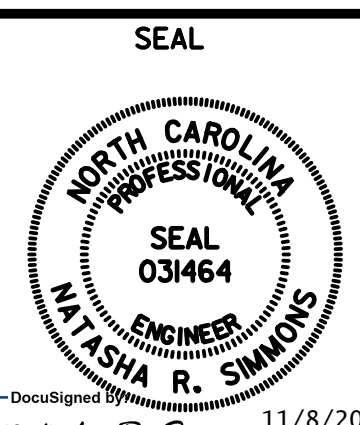
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

ELECTRICAL AND PROGRAMMING DETAILS FOR:



US 321 (N. Chester Street) at I-85 Northbound Ramp

Division 12 Gaston Co. Gastonia
 PLAN DATE: September 2016 REVIEWED BY: T.R. Terrell
 PREPARED BY: J.A. Wagner REVIEWED BY: N.R. Simmons



| REVISIONS | INIT. | DATE |
|-----------|-------|------|
| | | |
| | | |

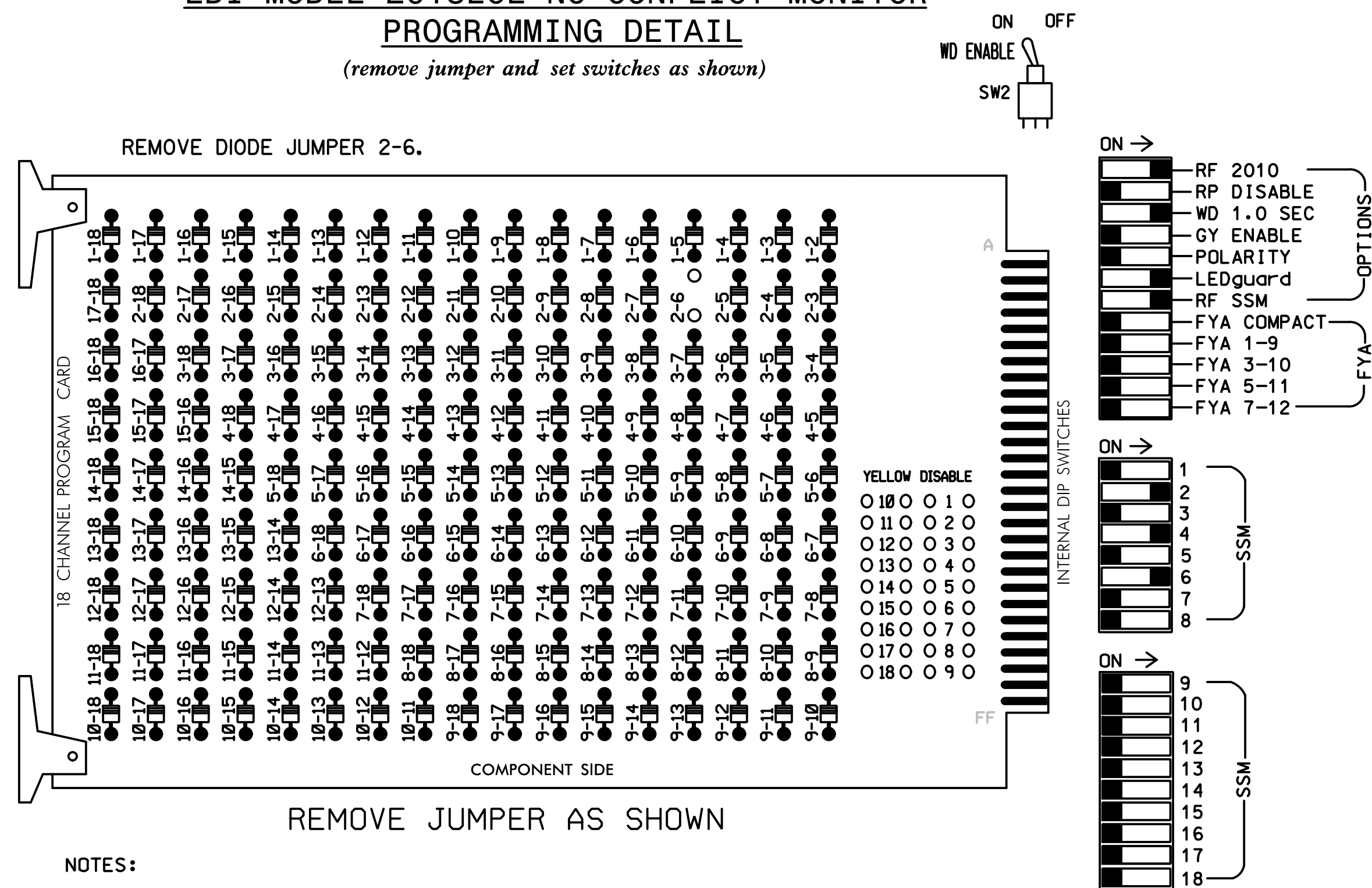
HNTB HNTB NORTH CAROLINA, P.C.
 343 E. Six Forks Road, Suite 200
 Raleigh, North Carolina 27609
 NC License No: C-1554
 (919) 546-8997

750 N. Greenfield Pkwy, Garner, NC 27529

DocuSigned by: Natasha R. Simmons
 11/8/2016
 SIGNATURE DATE
 SIG. INVENTORY NO. 12-0162T1

EDI MODEL 2018ECL-NC CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumper and set switches as shown)



NOTES:

1. Card is provided with all diode jumpers in place. Removal of any jumper allows its channels to run concurrently.
2. Ensure jumpers SEL2-SEL5 and SEL9 are present on the monitor board.
3. Ensure that Red Enable is active at all times during normal operation.
4. Connect serial cable from conflict monitor to comm. port 1 of 2070 controller. Ensure conflict monitor communicates with 2070.

NOTES

1. To prevent "flash-conflict" problems, insert red flash program blocks for all unused vehicle load switches in the output file. The installer shall verify that signal heads flash in accordance with the Signal Plans.
2. Enable simultaneous gap-out for all phases.
3. Program phases 2 and 6 for Variable Initial and Gap Reduction.
4. Program phases 2 and 6 for Start Up in Green.
5. Program phases 2 and 6 for Yellow Flash.
6. The cabinet and controller are part of the Gastonia Signal System.

EQUIPMENT INFORMATION

CONTROLLER.....2070
 CABINET.....332
 SOFTWARE.....ECONOLITE OASIS
 CABINET MOUNT.....BASE
 OUTPUT FILE POSITIONS...12
 LOAD SWITCHES USED.....S2,S5,S8
 PHASES USED.....2,4,6
 OVERLAPS.....NONE

SIGNAL HEAD HOOK-UP CHART

| LOAD SWITCH NO. | S1 | S2 | S3 | S4 | S5 | S6 | S7 | S8 | S9 | S10 | S11 | S12 |
|-----------------|----|-------|-------|----|-------|-------|----|-------|-------|-----|-----|-------|
| CMU CHANNEL NO. | 1 | 2 | 13 | 3 | 4 | 14 | 5 | 6 | 15 | 7 | 8 | 16 |
| PHASE | 1 | 2 | 2 PED | 3 | 4 | 4 PED | 5 | 6 | 6 PED | 7 | 8 | 8 PED |
| SIGNAL HEAD NO. | NU | 21,22 | NU | NU | 41,42 | NU | NU | 61,62 | NU | NU | NU | NU |
| RED | | 128 | | | | | | 134 | | | | |
| YELLOW | | 129 | | | | | | 135 | | | | |
| GREEN | | 130 | | | | | | 136 | | | | |
| RED ARROW | | | | | 101 | | | | | | | |
| YELLOW ARROW | | | | | 102 | | | | | | | |
| GREEN ARROW | | | | | 103 | | | | | | | |
| | | | | | | | | | | | | |
| | | | | | | | | | | | | |

NU = Not Used

INPUT FILE POSITION LAYOUT

(front view)

| FILE | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 |
|------|--------|-------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|-------------|
| U | ∅2/SYS | ∅2/S1 | ∅2/SYS | ∅2/SYS | ∅2/SYS | ∅4 | ∅2/SYS | ∅2/SYS | ∅2/SYS | ∅2/SYS | ∅2/SYS | ∅2/SYS | ∅2/SYS | FS |
| I | ∅2/SYS | ∅2/S1 | ∅2/SYS | ∅2/SYS | ∅2/SYS | 4A | ∅2/SYS | ∅2/SYS | ∅2/SYS | ∅2/SYS | ∅2/SYS | ∅2/SYS | ∅2/SYS | DC ISOLATOR |
| L | ∅2/SYS | ∅2/S1 | ∅2/SYS | ∅2/SYS | ∅2/SYS | 4B | ∅2/SYS | ∅2/SYS | ∅2/SYS | ∅2/SYS | ∅2/SYS | ∅2/SYS | ∅2/SYS | DC ISOLATOR |
| U | ∅6/SYS | ∅6/S3 | ∅6/SYS | ∅6/SYS | ∅6/SYS | ∅6/SYS | ∅6/SYS | ∅6/SYS | ∅6/SYS | ∅6/SYS | ∅6/SYS | ∅6/SYS | ∅6/SYS | ∅6/SYS |
| J | ∅6/SYS | ∅6/S3 | ∅6/SYS | ∅6/SYS | ∅6/SYS | ∅6/SYS | ∅6/SYS | ∅6/SYS | ∅6/SYS | ∅6/SYS | ∅6/SYS | ∅6/SYS | ∅6/SYS | ∅6/SYS |
| L | ∅6/SYS | ∅6/S3 | ∅6/SYS | ∅6/SYS | ∅6/SYS | ∅6/SYS | ∅6/SYS | ∅6/SYS | ∅6/SYS | ∅6/SYS | ∅6/SYS | ∅6/SYS | ∅6/SYS | ∅6/SYS |

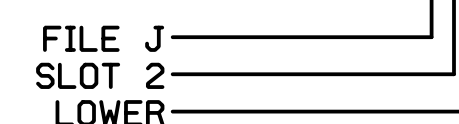
EX. : 1A, 2A, ETC. = LOOP NO.'S

FS = FLASH SENSE
 ST = STOP TIME

INPUT FILE CONNECTION & PROGRAMMING CHART

| LOOP NO. | LOOP TERMINAL | INPUT FILE POS. | PIN NO. | INPUT ASSIGNMENT NO. | DETECTOR NO. | NEMA PHASE | CALL | EXTEND | FULL TIME DELAY | STRETCH TIME | DELAY TIME |
|----------|---------------|-----------------|---------|----------------------|--------------|------------|------|--------|-----------------|--------------|------------|
| 2A/S1 | TB2-5,6 | I2U | 39 | 1 | 2 | 2/SYS | Y | Y | | | |
| 2B/S2 | TB2-7,8 | I2L | 43 | 5 | 12 | 2/SYS | Y | Y | | | |
| 4A | TB4-9,10 | I6U | 41 | 3 | 4 | 4 | Y | Y | | | |
| 4B | TB4-11,12 | I6L | 45 | 7 | 14 | 4 | Y | Y | | | |
| 6A/S3 | TB3-5,6 | J2U | 40 | 2 | 6 | 6/SYS | Y | Y | | | |
| 6A/S4 | TB3-7,8 | J2L | 44 | 6 | 16 | 6/SYS | Y | Y | | | |

INPUT FILE POSITION LEGEND: J2L



THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 12-0162T2
 DESIGNED: September 2016
 SEALED: 11-08-2016
 REVISED:

Temporary Signal Phase 1, Step 1A

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

ELECTRICAL AND PROGRAMMING DETAILS FOR:

US 321 (N. Chester Street) at I-85 Northbound Ramp

SEAL

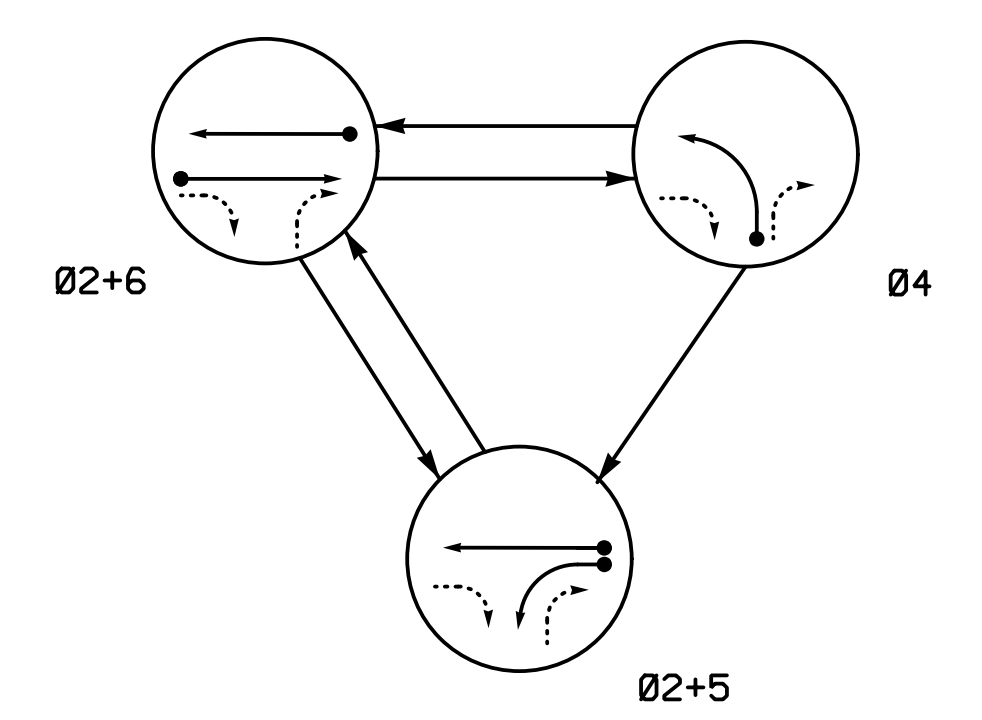
| Division 12 | Gaston Co. | Gastonia |
|---------------------------|---------------------------|----------|
| PLAN DATE: September 2016 | REVIEWED BY: T.R. Terrell | |
| PREPARED BY: J.A. Wagner | REVIEWED BY: N.R. Simmons | |
| REVISIONS | INIT. | DATE |
| | | |

HNTB HNTB NORTH CAROLINA, P.C.
 343 E. Six Forks Road, Suite 200
 Raleigh, North Carolina 27609
 NC License No: C-1554
 (919) 546-8997

750 N. Greenfield Pkwy, Garner, NC 27529

DocuSigned By: *Natasha R. Simmons* 11/8/2016
 SIGNATURE DATE
 SIG. INVENTORY NO. 12-0162T2

PHASING DIAGRAM

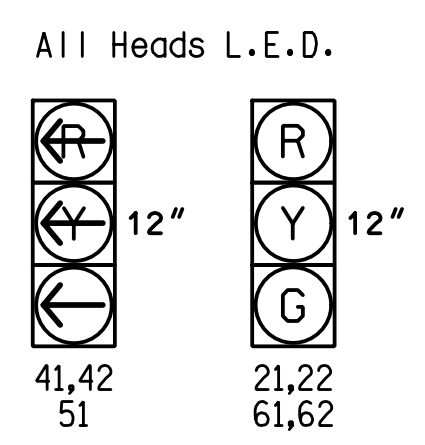


PHASING DIAGRAM DETECTION LEGEND

- ←● DETECTED MOVEMENT
- ← UNDETECTED MOVEMENT (OVERLAP)
- ← UN SIGNALIZED MOVEMENT
- ← PEDESTRIAN MOVEMENT

| SIGNAL FACE | PHASE | | | |
|-------------|-------|-------|-----|-------|
| | Ø 2+5 | Ø 2+6 | Ø 4 | FLASH |
| 21,22 | G | G | R | Y |
| 41,42 | R | R | - | R |
| 51 | - | R | R | R |
| 61,62 | R | G | R | Y |

SIGNAL FACE I.D.

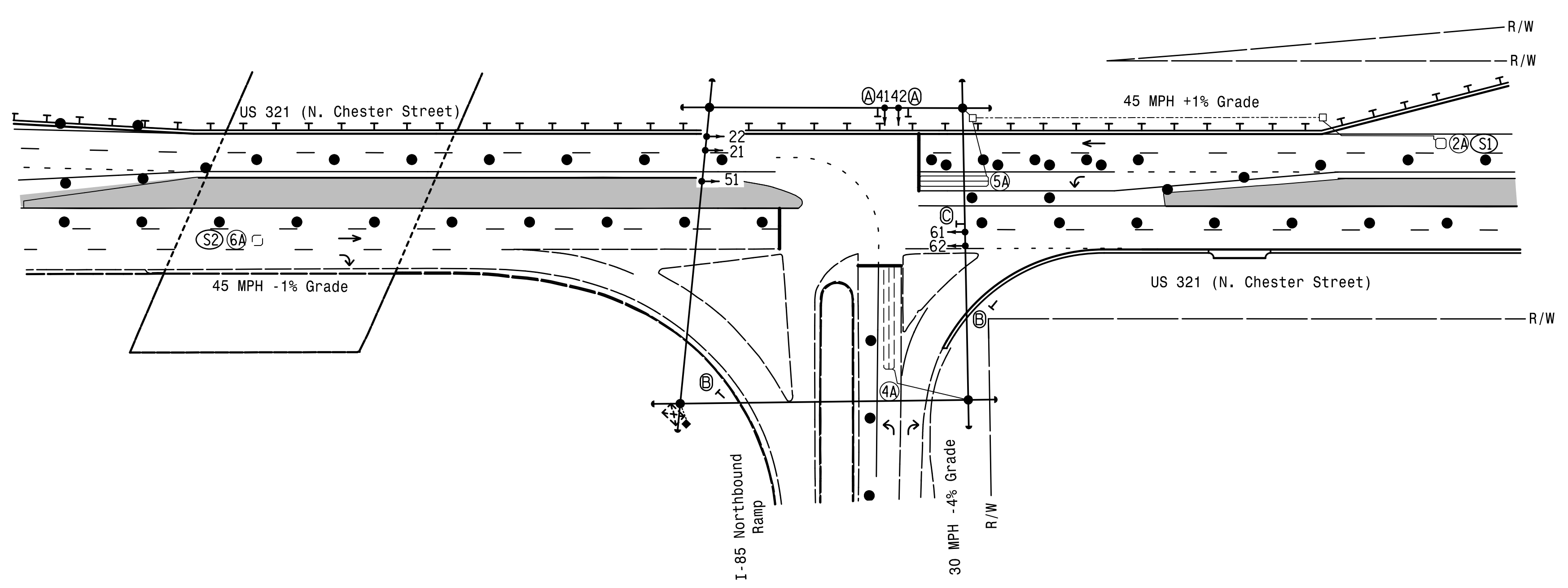


| OASIS 2070 LOOP & DETECTOR INSTALLATION CHART | | | | | | | | | | | |
|---|-----------|----------------------------|-------|----------|----------------------|---------|-----------|-----------------|--------------|------------|------------------|
| INDUCTIVE LOOPS | | | | | DETECTOR PROGRAMMING | | | | | | |
| LOOP | SIZE (FT) | DISTANCE FROM STOPBAR (FT) | TURNS | NEW LOOP | PHASE | CALLING | EXTENSION | FULL TIME DELAY | STRETCH TIME | DELAY TIME | SYSTEM LOOP CARD |
| 2A/S1 | 6X6 | 300 | 6 | Y | 2 | Y | Y | - | - | - | Y |
| 4A | 6X60 | 0 | 2-4-2 | - | 4 | Y | Y | - | - | - | - |
| 5A | 6X40 | 0 | 2-4-2 | Y | 5 | Y | Y | - | - | - | - |
| 6A/S2 | 6X6 | 300 | 4 | - | 6 | Y | Y | - | - | - | Y |

3 Phase Fully Actuated (Gastonia City Signal System)

NOTES

- Refer to "Roadway Standard Drawings NCDOT" dated January 2012 and "Standard Specifications for Roads and Structures" dated January 2012.
- Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
- Phase 5 may be lagged.
- Reposition signal heads 21,22, 41,42,51,61,62, and signs (A) and (C).
- Set all detector units to presence mode.
- Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.
- Signal System Data: Controller Asset #0162.



OASIS 2070 TIMING CHART

| FEATURE | PHASE | | | |
|-------------------------|------------|-----|-----|------------|
| | 2 | 4 | 5 | 6 |
| Min Green 1 * | 12 | 7 | 7 | 12 |
| Extension 1 * | 6.0 | 1.0 | 2.0 | 6.0 |
| Max Green 1 * | 90 | 25 | 15 | 90 |
| Yellow Clearance | 4.4 | 3.0 | 3.0 | 4.6 |
| Red Clearance | 1.1 | 3.1 | 2.6 | 1.1 |
| Red Revert | 2.0 | 2.0 | 2.0 | 2.0 |
| Walk 1 * | - | - | - | - |
| Don't Walk 1 | - | - | - | - |
| Seconds Per Actuation * | 2.5 | - | - | 2.5 |
| Max Variable Initial * | 34 | - | - | 34 |
| Time Before Reduction * | 15 | - | - | 15 |
| Time To Reduce * | 30 | - | - | 30 |
| Minimum Gap | 3.0 | - | - | 3.0 |
| Recall Mode | MIN RECALL | - | - | MIN RECALL |
| Vehicle Call Memory | YELLOW | - | - | YELLOW |
| Dual Entry | - | - | - | - |
| Simultaneous Gap | ON | ON | ON | ON |

* These values may be field adjusted. Do not adjust Min Green and Extension times for phases 2 and 6 lower than what is shown. Min Green for all other phases should not be lower than 4 seconds.

| PROPOSED | | EXISTING | |
|----------|--|----------|-----|
| ○→ | Traffic Signal Head | ●→ | N/A |
| ●→ | Modified Signal Head | - | N/A |
| ↓ | Sign | ↓ | N/A |
| ○→ | Pedestrian Signal Head With Push Button & Sign | ↓ | N/A |
| ○→ | Signal Pole with Guy | ●→ | N/A |
| ○→ | Signal Pole with Sidewalk Guy | ●→ | N/A |
| □ | Inductive Loop Detector | □ | N/A |
| □ | Controller & Cabinet | □ | N/A |
| □ | Junction Box | □ | N/A |
| --- | 2-in Underground Conduit | --- | N/A |
| N/A | Right of Way | --- | N/A |
| → | Directional Arrow | → | N/A |
| N/A | Guardrail | --- | N/A |
| (A) | Left Arrow "ONLY" Sign (R3-5L) | (A) | N/A |
| (B) | "YIELD" Sign (R1-2) | (B) | N/A |
| (C) | No U-Turn Sign (R3-4) | (C) | N/A |
| ■ | Construction Zone | ■ | N/A |
| ● | Construction Zone Drums | ● | N/A |

Temporary Signal Phase 1, Steps 6 & 7

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

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343 E. Six Forks Road, Suite 200
Raleigh, North Carolina 27609
NC License No: C-1554
(919) 546-8997

Prepared For
TRANSPORTATION MOBILITY AND SAFETY DIVISION
STATE OF NORTH CAROLINA
Signal Design Section

750 N. Greenfield Pkwy, Garner, NC 27529

SCALE
0 50
1"=50'

US 321 (N. Chester Street) at I-85 Northbound Ramp

Division 12 Gaston Co. Gastonia

PLAN DATE: September 2016 REVIEWED BY: T.R. Terrell

PREPARED BY: J.A. Wagner REVIEWED BY: N.R. Simmons

| REVISIONS | INIT. | DATE |
|-----------|-------|------|
| | | |

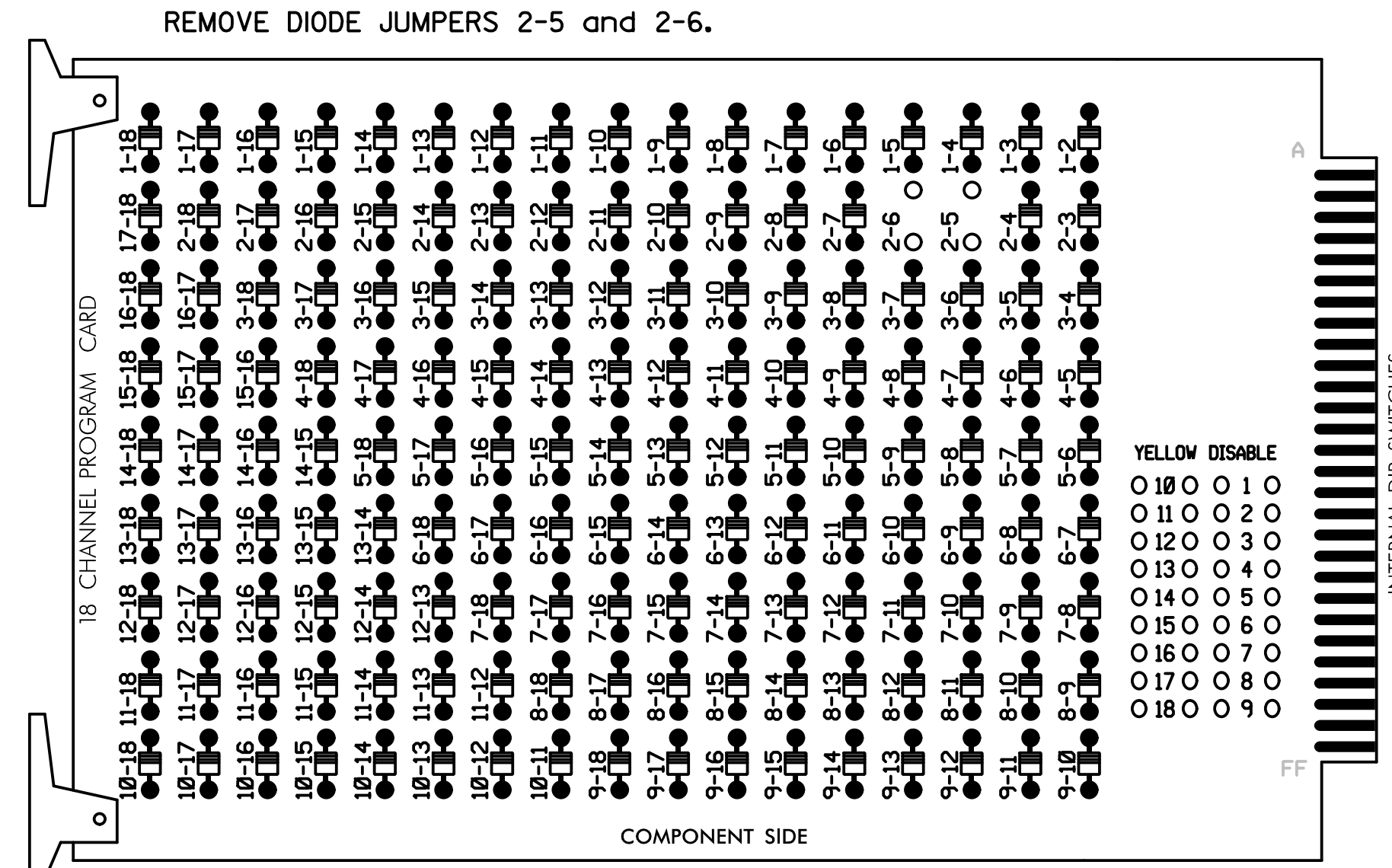
SEAL
NORTH CAROLINA PROFESSIONAL ENGINEER
SEAL 031464
W. TASHA R. SIMMONS

DocuSigned by:
Natasha R. Simmons
11/8/2016
SIGNATURE DATE

SIG. INVENTORY NO. 12-0162T3

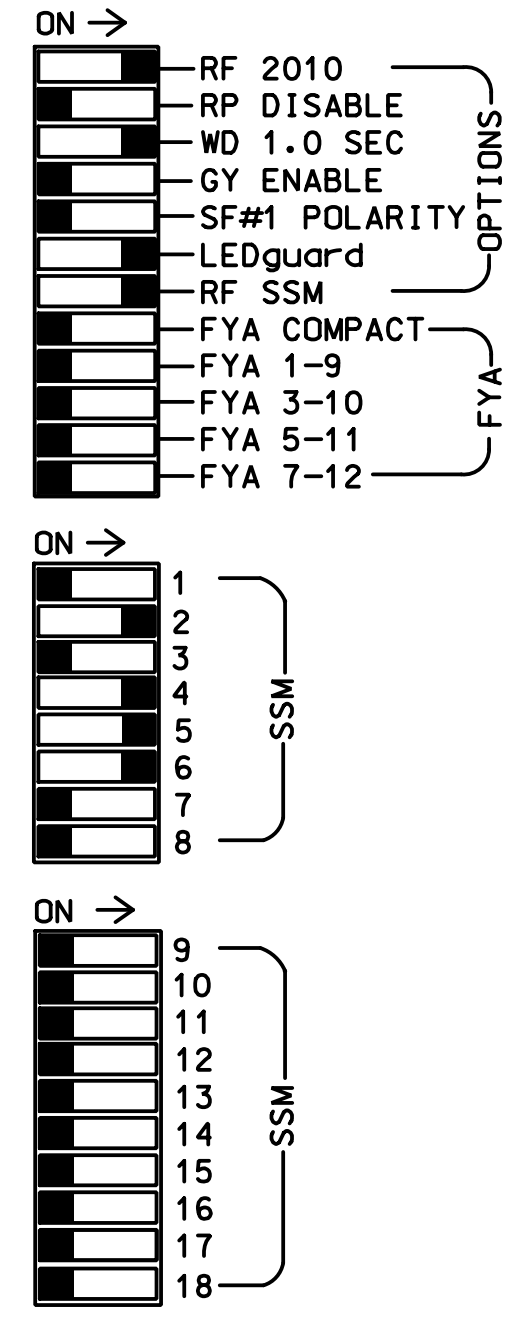
EDI MODEL 2018ECL-NC CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)



NOTES:

1. Card is provided with all diode jumpers in place. Removal of any jumper allows its channels to run concurrently.
2. Ensure jumpers SEL2-SEL5 and SEL9 are present on the monitor board.
3. Ensure that Red Enable is active at all times during normal operation.
4. Connect serial cable from conflict monitor to comm. port 1 of 2070 controller. Ensure conflict monitor communicates with 2070.



NOTES

1. To prevent "flash-conflict" problems, insert red flash program blocks for all unused vehicle load switches in the output file. The installer shall verify that signal heads flash in accordance with the Signal Plans.
2. Enable Simultaneous Gap-Out for all phases.
3. Program phases 2 and 6 for Variable Initial and Gap Reduction.
4. Program phases 2 and 6 for Start Up In Green.
5. Program phases 2 and 6 for Yellow Flash.
6. The cabinet and controller are part of the Gastonia City System.

EQUIPMENT INFORMATION

CONTROLLER.....2070
 CABINET.....332
 SOFTWARE.....ECONOLITE OASIS
 CABINET MOUNT.....BASE
 OUTPUT FILE POSITIONS...12
 LOAD SWITCHES USED.....S2,S5,S7,S8
 PHASES USED.....2,4,5,6
 OVERLAPS.....NONE

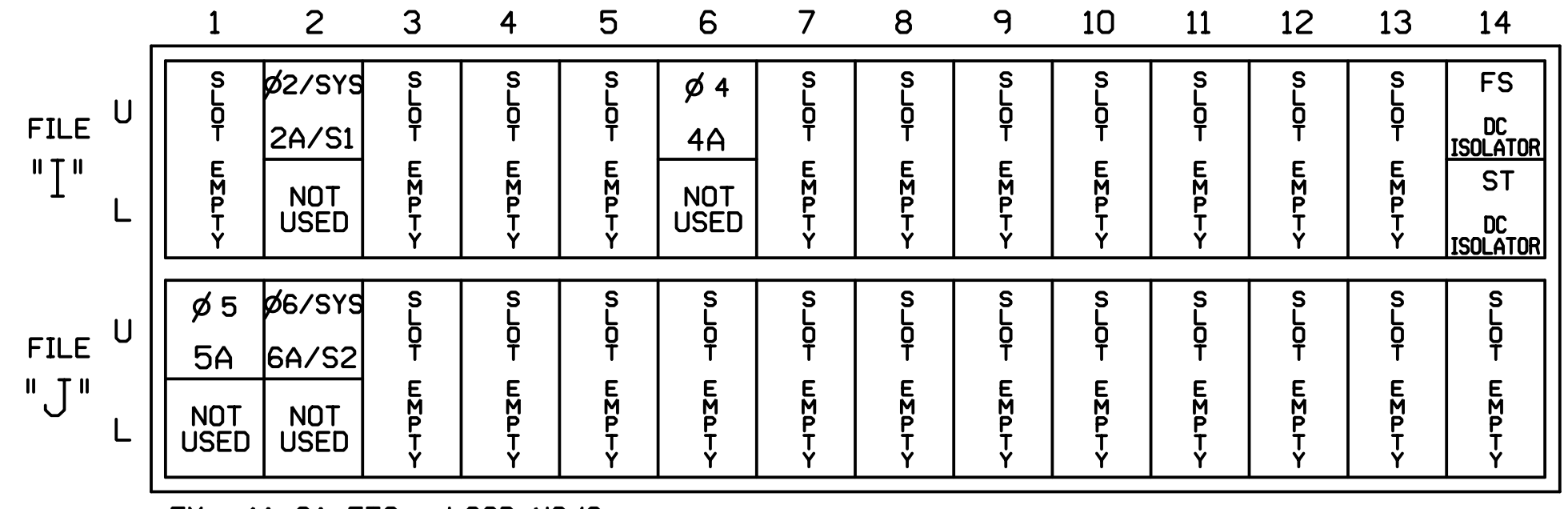
SIGNAL HEAD HOOK-UP CHART

| LOAD SWITCH NO. | S1 | S2 | S3 | S4 | S5 | S6 | S7 | S8 | S9 | S10 | S11 | S12 |
|-----------------|----|-------|-------|----|-------|-------|-----|-------|-------|-----|-----|-------|
| CMU CHANNEL NO. | 1 | 2 | 13 | 3 | 4 | 14 | 5 | 6 | 15 | 7 | 8 | 16 |
| PHASE | 1 | 2 | 2 PED | 3 | 4 | 4 PED | 5 | 6 | 6 PED | 7 | 8 | 8 PED |
| SIGNAL HEAD NO. | NU | 21,22 | NU | NU | 41,42 | NU | 51 | 61,62 | NU | NU | NU | NU |
| RED | | 128 | | | | | | 134 | | | | |
| YELLOW | | 129 | | | | | | 135 | | | | |
| GREEN | | 130 | | | | | | 136 | | | | |
| RED ARROW | | | | | 101 | | 131 | | | | | |
| YELLOW ARROW | | | | | 102 | | 132 | | | | | |
| GREEN ARROW | | | | | 103 | | 133 | | | | | |
| Hand icon | | | | | | | | | | | | |
| Person icon | | | | | | | | | | | | |

NU = Not Used

INPUT FILE POSITION LAYOUT

(front view)



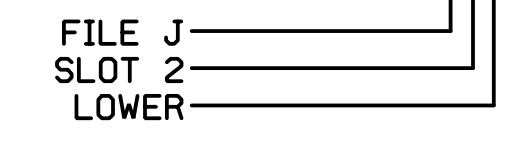
EX.: 1A, 2A, ETC. = LOOP NO.'S

FS = FLASH SENSE
 ST = STOP TIME
 PRE = PREEMPT

INPUT FILE CONNECTION & PROGRAMMING CHART

| LOOP NO. | LOOP TERMINAL | INPUT FILE POS. | PIN NO. | INPUT ASSIGNMENT NO. | DETECTOR NO. | NEMA PHASE | CALL | EXTEND | FULL TIME DELAY | STRETCH TIME | DELAY TIME |
|----------|---------------|-----------------|---------|----------------------|--------------|------------|------|--------|-----------------|--------------|------------|
| 2A/S1 | TB2-5,6 | I2U | 39 | 1 | 2 | 2/SYS | Y | Y | | | |
| 4A | TB4-9,10 | I6U | 41 | 3 | 4 | 4 | Y | Y | | | |
| 5A | TB3-1,2 | J1U | 55 | 17 | 5 | 5 | Y | Y | | | |
| 6A/S2 | TB3-5,6 | J2U | 40 | 2 | 6 | 6/SYS | Y | Y | | | |

INPUT FILE POSITION LEGEND: J2L



THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 12-0162T3
 DESIGNED: September 2016
 SEALED: 11-08-2016
 REVISED:

Temporary Signal Phase 1, Steps 6 & 7

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

ELECTRICAL AND PROGRAMMING DETAILS FOR:

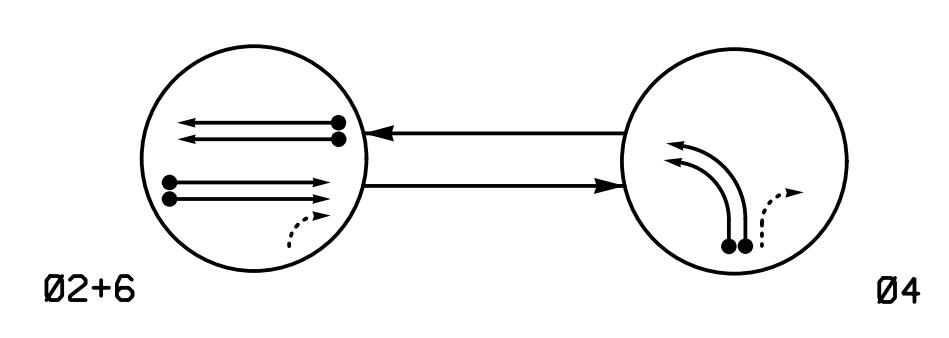
Prepared for:
 US 321 (N. Chester Street) at I-85 Northbound Ramp
 Division 12 Gaston Co. Gastonia
 PLAN DATE: September 2016 REVIEWED BY: T.R. Terrell
 PREPARED BY: J.A. Wagner REVIEWED BY: N.R. Simmons

| REVISIONS | INIT. | DATE |
|-----------|-------|------|
| | | |

SEAL
 NORTH CAROLINA PROFESSIONAL ENGINEER
 SEAL 031464
 N.TASHA R. SIMMONS
 11/8/2016
 SIGNATURE DATE
 SIG. INVENTORY NO. 12-0162T3

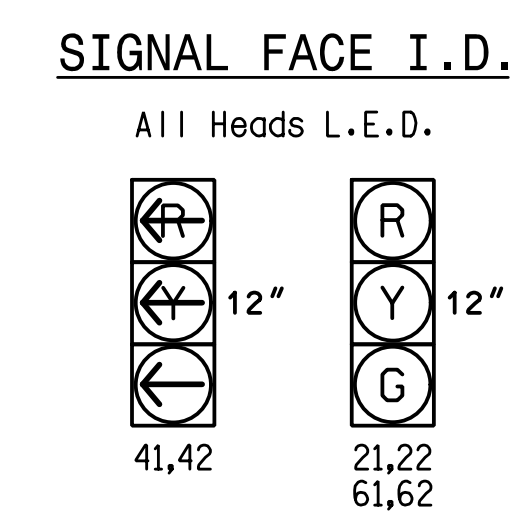
HNTB
 HNTB NORTH CAROLINA, P.C.
 343 E. Six Forks Road, Suite 200
 Raleigh, North Carolina 27609
 NC License No: C-1554
 (919) 546-8997

PHASING DIAGRAM



PHASING DIAGRAM DETECTION LEGEND
 ● ← DETECTED MOVEMENT
 — ← UNDETECTED MOVEMENT (OVERLAP)
 - - - ← UNSIGNALIZED MOVEMENT
 - - - ← PEDESTRIAN MOVEMENT

| SIGNAL FACE | PHASE | | |
|-------------|-------|-----|---------|
| | Ø 2+6 | Ø 4 | F LIGHT |
| 21,22 | G | R | Y |
| 41,42 | R | Y | R |
| 61,62 | G | R | Y |

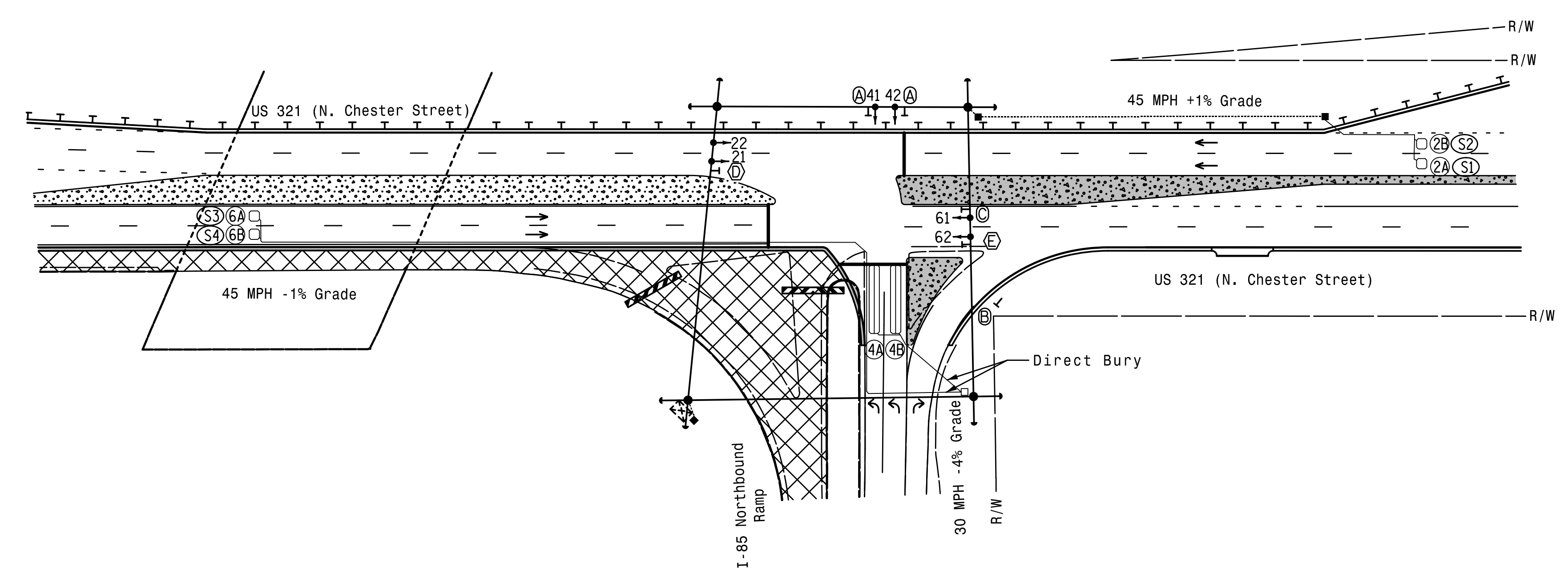


| OASIS 2070 LOOP & DETECTOR INSTALLATION CHART | | | | | | | | | | | | |
|---|-----------|----------------------------|-------|----------|----------------------|---------|-----------|-----------------|--------------|------------|-------------|----------|
| INDUCTIVE LOOPS | | | | | DETECTOR PROGRAMMING | | | | | | | |
| LOOP | SIZE (FT) | DISTANCE FROM STOPBAR (FT) | TURNS | NEW LOOP | PHASE | CALLING | EXTENSION | FULL TIME DELAY | STRETCH TIME | DELAY TIME | SYSTEM LOOP | NEW CARD |
| 2A/S1 | 6X6 | 300 | 6 | Y | 2 | Y | Y | - | - | - | Y | - |
| 2B/S2 | 6X6 | 300 | 6 | Y | 2 | Y | Y | - | - | - | Y | - |
| 4A | 6X40 | 0 | 2-4-2 | Y | 4 | Y | Y | - | - | - | - | - |
| 4B | 6X40 | 0 | 2-4-2 | Y | 4 | Y | Y | - | - | - | - | - |
| 6A/S3 | 6X6 | 300 | 4 | Y | 6 | Y | Y | - | - | - | Y | - |
| 6B/S4 | 6X6 | 300 | 4 | Y | 6 | Y | Y | - | - | - | Y | - |

2 Phase Fully Actuated (Gastonia City Signal System)

NOTES

- Refer to "Roadway Standard Drawings NCDOT" dated January 2012 and "Standard Specifications for Roads and Structures" dated January 2012.
- Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
- Reposition signal heads 21,22, 41,42,61,62 and signs (A) and (C).
- Set all detector units to presence mode.
- Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.
- Signal System data: Controller Asset #0162.



LEGEND

| PROPOSED | EXISTING |
|--|----------|
| ○ → Traffic Signal Head | ● → N/A |
| ○ → Modified Signal Head | ○ → N/A |
| ⊥ Sign | ⊥ N/A |
| ⊥ Pedestrian Signal Head With Push Button & Sign | ⊥ N/A |
| ○ → Signal Pole with Guy | ● → N/A |
| ○ → Signal Pole with Sidewalk Guy | ● → N/A |
| ⊠ Inductive Loop Detector | ⊠ N/A |
| ⊠ Controller & Cabinet | ⊠ N/A |
| ⊠ Junction Box | ⊠ N/A |
| ⊠ 2-in Underground Conduit | ⊠ N/A |
| N/A Right of Way | --- N/A |
| → Directional Arrow | → N/A |
| N/A Guardrail | ⊥ N/A |
| (A) Left Arrow "ONLY" Sign (R3-5L) | (A) N/A |
| (B) "YIELD" Sign (R1-2) | (B) N/A |
| (C) No U-Turn Sign (R3-4) | (C) N/A |
| (D) No Left Turn Sign (R3-2) | (D) N/A |
| (E) No Right Turn Sign (R3-1) | (E) N/A |
| Construction Zone | N/A |
| Construction Zone Barricade | N/A |

OASIS 2070 TIMING CHART

| FEATURE | PHASE | | |
|-------------------------|------------|-----|------------|
| | 2 | 4 | 6 |
| Min Green 1 * | 12 | 7 | 12 |
| Extension 1 * | 6.0 | 2.0 | 6.0 |
| Max Green 1 * | 90 | 25 | 90 |
| Yellow Clearance | 4.4 | 3.0 | 4.6 |
| Red Clearance | 1.2 | 3.3 | 1.3 |
| Red Revert | 2.0 | 2.0 | 2.0 |
| Walk 1 * | - | - | - |
| Don't Walk 1 | - | - | - |
| Seconds Per Actuation * | 1.5 | - | 1.5 |
| Max Variable Initial * | 34 | - | 34 |
| Time Before Reduction * | 15 | - | 15 |
| Time To Reduce * | 30 | - | 30 |
| Minimum Gap | 3.0 | - | 3.0 |
| Recall Mode | MIN RECALL | - | MIN RECALL |
| Vehicle Call Memory | YELLOW | - | YELLOW |
| Dual Entry | - | - | - |
| Simultaneous Gap | ON | ON | ON |

* These values may be field adjusted. Do not adjust Min Green and Extension times for phases 2 and 6 lower than what is shown. Min Green for all other phases should not be lower than 4 seconds.

Temporary Signal Phase 2, Step 1

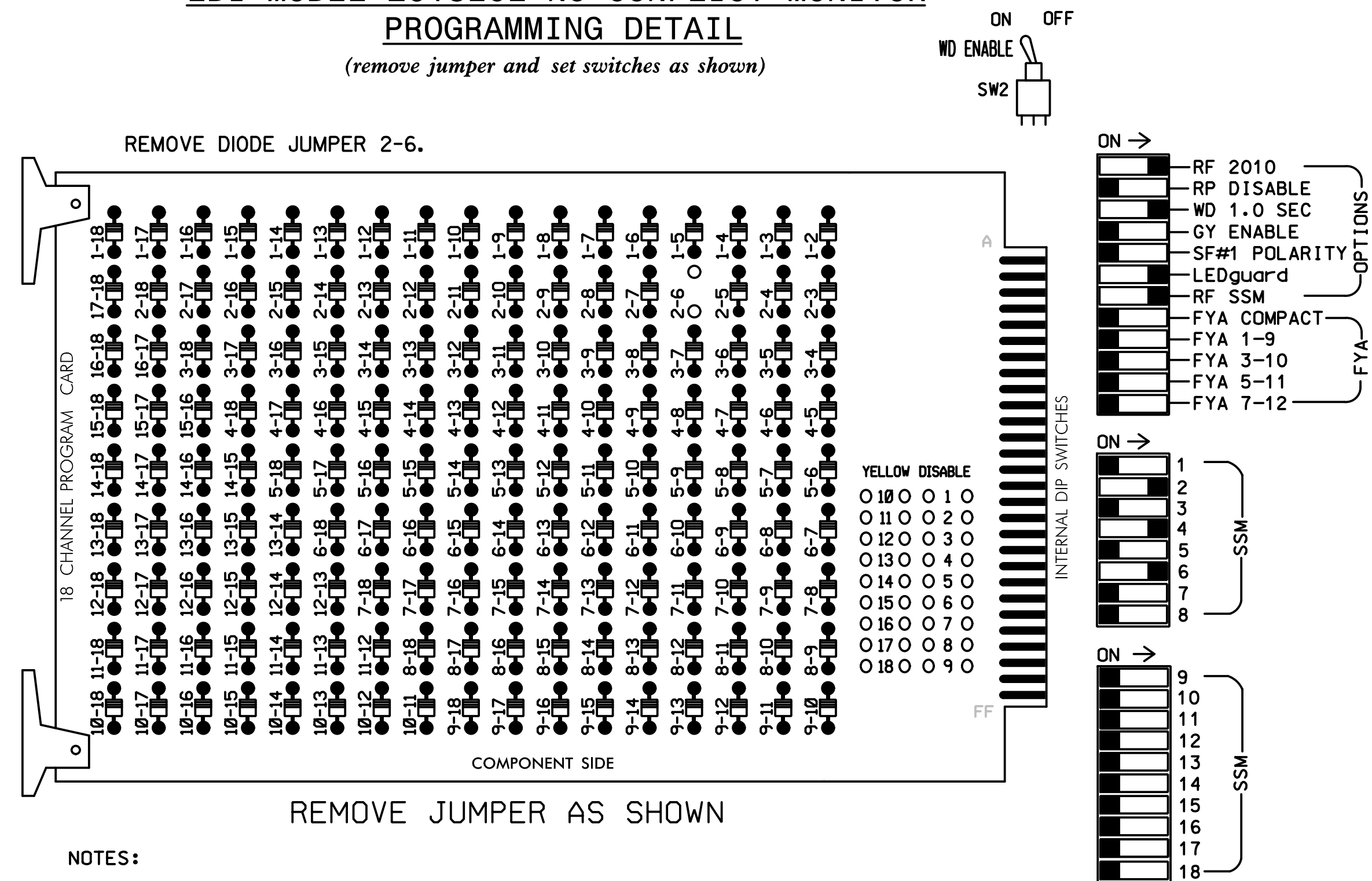
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| | | | |
|--------------|--|---|--|
| | US 321 (N. Chester Street) at I-85 Northbound Ramp | | |
| | Division 12 Gaston Co. Gastonia | PLAN DATE: September 2016 REVIEWED BY: T.R. Terrell | |
| SCALE 1"=50' | REVISIONS | INIT. DATE | Documented by: <i>Natasha R. Simmons</i> 11/8/2016 SIGNATURE DATE SIG. INVENTORY NO. 12-0162T4 |

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 343 E. Six Forks Road, Suite 200
 Raleigh, North Carolina 27609
 NC License No: C-1554
 (919) 546-8997

EDI MODEL 2018ECL-NC CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumper and set switches as shown)



REMOVE JUMPER AS SHOWN

NOTES:

1. Card is provided with all diode jumpers in place. Removal of any jumper allows its channels to run concurrently.
2. Ensure jumpers SEL2-SEL5 and SEL9 are present on the monitor board.
3. Ensure that Red Enable is active at all times during normal operation.
4. Connect serial cable from conflict monitor to comm. port 1 of 2070 controller. Ensure conflict monitor communicates with 2070.

NOTES

1. To prevent "flash-conflict" problems, insert red flash program blocks for all unused vehicle load switches in the output file. The installer shall verify that signal heads flash in accordance with the Signal Plans.
2. Enable Simultaneous Gap-Out for all phases.
3. Program phases 2 and 6 for Variable Initial and Gap Reduction.
4. Program phases 2 and 6 for Start Up In Green.
5. Program phases 2 and 6 for Yellow Flash.
6. The cabinet and controller are part of the Gastonia City Signal System.

EQUIPMENT INFORMATION

CONTROLLER.....2070
 CABINET.....332
 SOFTWARE.....ECONOLITE OASIS
 CABINET MOUNT.....BASE
 OUTPUT FILE POSITIONS...12
 LOAD SWITCHES USED.....S2,S5,S8
 PHASES USED.....2,4,6
 OVERLAPS.....NONE

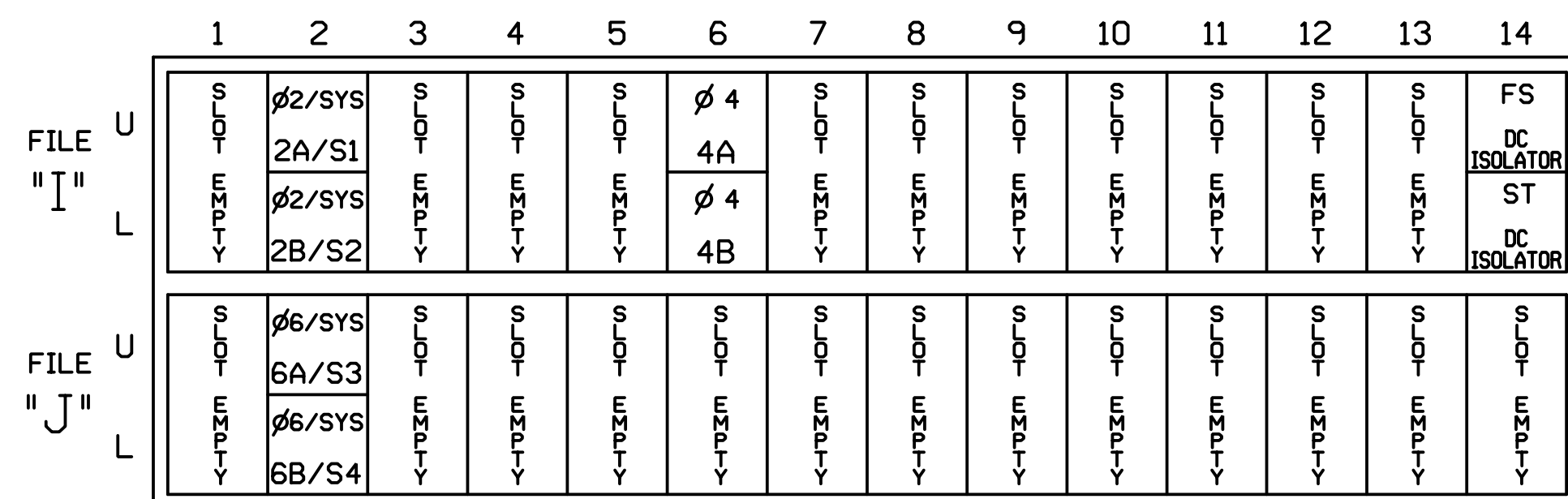
SIGNAL HEAD HOOK-UP CHART

| LOAD SWITCH NO. | S1 | S2 | S3 | S4 | S5 | S6 | S7 | S8 | S9 | S10 | S11 | S12 |
|-----------------|----|-------|-------|----|-------|-------|----|-------|-------|-----|-----|-------|
| CMU CHANNEL NO. | 1 | 2 | 13 | 3 | 4 | 14 | 5 | 6 | 15 | 7 | 8 | 16 |
| PHASE | 1 | 2 | 2 PED | 3 | 4 | 4 PED | 5 | 6 | 6 PED | 7 | 8 | 8 PED |
| SIGNAL HEAD NO. | NU | 21,22 | NU | NU | 41,42 | NU | NU | 61,62 | NU | NU | NU | NU |
| RED | | 128 | | | | | | 134 | | | | |
| YELLOW | | 129 | | | | | | 135 | | | | |
| GREEN | | 130 | | | | | | 136 | | | | |
| RED ARROW | | | | | 101 | | | | | | | |
| YELLOW ARROW | | | | | 102 | | | | | | | |
| GREEN ARROW | | | | | 103 | | | | | | | |
| Hand icon | | | | | | | | | | | | |
| Person icon | | | | | | | | | | | | |

NU = Not Used

INPUT FILE POSITION LAYOUT

(front view)



EX. : 1A, 2A, ETC. = LOOP NO.'S

FS = FLASH SENSE
 ST = STOP TIME

INPUT FILE CONNECTION & PROGRAMMING CHART

| LOOP NO. | LOOP TERMINAL | INPUT FILE POS. | PIN NO. | INPUT ASSIGNMENT NO. | DETECTOR NO. | NEMA PHASE | CALL | EXTEND | FULL TIME DELAY | STRETCH TIME | DELAY TIME |
|----------|---------------|-----------------|---------|----------------------|--------------|------------|------|--------|-----------------|--------------|------------|
| 2A/S1 | TB2-5,6 | I2U | 39 | 1 | 2 | 2/SYS | Y | Y | | | |
| 2B/S2 | TB2-7,8 | I2L | 43 | 5 | 12 | 2/SYS | Y | Y | | | |
| 4A | TB4-9,10 | I6U | 41 | 3 | 4 | 4 | Y | Y | | | |
| 4B | TB4-11,12 | I6L | 45 | 7 | 14 | 4 | Y | Y | | | |
| 6A/S3 | TB3-5,6 | J2U | 40 | 2 | 6 | 6/SYS | Y | Y | | | |
| 6B/S4 | TB3-7,8 | J2L | 44 | 6 | 16 | 6/SYS | Y | Y | | | |

INPUT FILE POSITION LEGEND: J2L



THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 12-0162T4
 DESIGNED: September 2016
 SEALED: 11-08-2016
 REVISED:

Temporary Signal Phase 2, Step 1

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

ELECTRICAL AND PROGRAMMING DETAILS FOR:

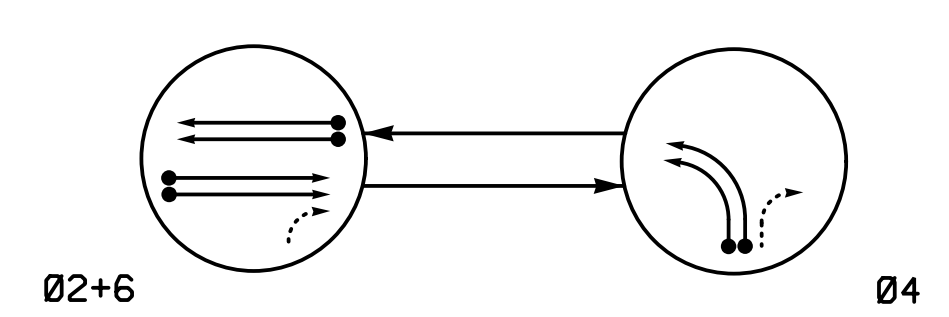
US 321 (N. Chester Street) at I-85 Northbound Ramp
 Division 12 Gaston Co. Gastonia
 PLAN DATE: September 2016 REVIEWED BY: T.R. Terrell
 PREPARED BY: J.A. Wagner REVIEWED BY: N.R. Simmons

| REVISIONS | INIT. | DATE |
|-----------|-------|------|
| | | |

SEAL

DocuSigned by: Natasha R. Simmons 11/8/2016
 SIGNATURE DATE
 SIG. INVENTORY NO. 12-0162T4

PHASING DIAGRAM



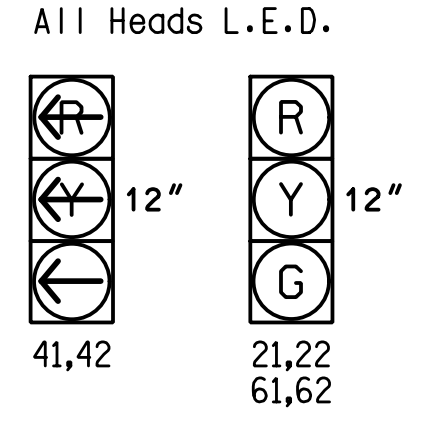
PHASING DIAGRAM DETECTION LEGEND

- ←● DETECTED MOVEMENT
- ← UNDETECTED MOVEMENT (OVERLAP)
- UNSIGNALIZED MOVEMENT
- ←--- PEDESTRIAN MOVEMENT

TABLE OF OPERATION

| SIGNAL FACE | PHASE | | |
|-------------|-------|-----|---------|
| | Ø 2+6 | Ø 4 | F LIGHT |
| 21,22 | G | R | Y |
| 41,42 | R | --- | --- |
| 61,62 | G | R | Y |

SIGNAL FACE I.D.



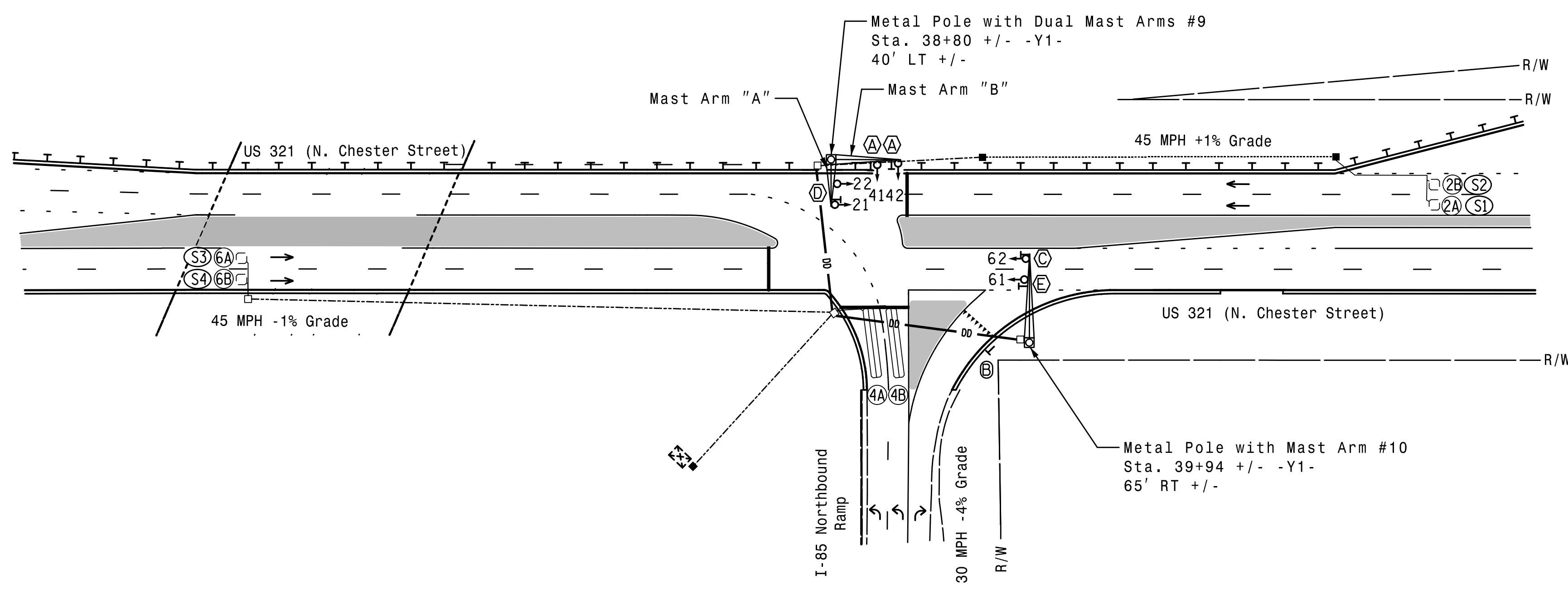
OASIS 2070 LOOP & DETECTOR INSTALLATION CHART

| LOOP | SIZE (FT) | DISTANCE FROM STOPBAR (FT) | TURNS | NEW LOOP | DETECTOR PROGRAMMING | | | | | | | |
|-------|-----------|----------------------------|-------|----------|----------------------|---------|-----------|-----------------|--------------|------------|-------------|----------|
| | | | | | PHASE | CALLING | EXTENSION | FULL TIME DELAY | STRETCH TIME | DELAY TIME | SYSTEM LOOP | NEW CARD |
| 2A/S1 | 6X6 | 300 | 6 | - | 2 | Y | Y | - | - | - | Y | - |
| 2B/S2 | 6X6 | 300 | 6 | - | 2 | Y | Y | - | - | - | Y | - |
| 4A | 6X40 | 0 | 2-4-2 | Y | 4 | Y | Y | - | - | - | - | - |
| 4B | 6X40 | 0 | 2-4-2 | Y | 4 | Y | Y | - | - | - | - | - |
| 6A/S3 | 6X6 | 300 | 4 | - | 6 | Y | Y | - | - | - | Y | - |
| 6B/S4 | 6X6 | 300 | 4 | - | 6 | Y | Y | - | - | - | Y | - |

2 Phase Fully Actuated (Gastonia City Signal System)

NOTES

- Refer to "Roadway Standard Drawings NCDOT" dated January 2012 and "Standard Specifications for Roads and Structures" dated January 2012.
- Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
- Set all detector units to presence mode.
- Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.
- Signal System data: Controller Asset #0162.



OASIS 2070 TIMING CHART

| FEATURE | PHASE | | |
|-------------------------|------------|-----|------------|
| | 2 | 4 | 6 |
| Min Green 1 * | 12 | 7 | 12 |
| Extension 1 * | 6.0 | 2.0 | 6.0 |
| Max Green 1 * | 90 | 25 | 90 |
| Yellow Clearance | 4.4 | 3.0 | 4.6 |
| Red Clearance | 1.2 | 3.3 | 1.3 |
| Red Revert | 2.0 | 2.0 | 2.0 |
| Walk 1 * | - | - | - |
| Don't Walk 1 | - | - | - |
| Seconds Per Actuation * | 1.5 | - | 1.5 |
| Max Variable Initial * | 34 | - | 34 |
| Time Before Reduction * | 15 | - | 15 |
| Time To Reduce * | 30 | - | 30 |
| Minimum Gap | 3.0 | - | 3.0 |
| Recall Mode | MIN RECALL | - | MIN RECALL |
| Vehicle Call Memory | YELLOW | - | YELLOW |
| Dual Entry | - | - | - |
| Simultaneous Gap | ON | ON | ON |

* These values may be field adjusted. Do not adjust Min Green and Extension times for phases 2 and 6 lower than what is shown. Min Green for all other phases should not be lower than 4 seconds.

LEGEND

| PROPOSED | EXISTING |
|--|--|
| ○ → Traffic Signal Head | ● → Traffic Signal Head |
| ○ → Modified Signal Head | N/A |
| ⊥ Sign | ⊥ Sign |
| ⊥ Pedestrian Signal Head With Push Button & Sign | ⊥ Pedestrian Signal Head With Push Button & Sign |
| ⊥ Signal Pole with Guy | ⊥ Signal Pole with Guy |
| ⊥ Signal Pole with Sidewalk Guy | ⊥ Signal Pole with Sidewalk Guy |
| ⊥ Inductive Loop Detector | ⊥ Inductive Loop Detector |
| ⊥ Controller & Cabinet | ⊥ Controller & Cabinet |
| ⊥ Junction Box | ⊥ Junction Box |
| ⊥ 2-in Underground Conduit | ⊥ 2-in Underground Conduit |
| N/A Right of Way | --- Right of Way |
| → Directional Arrow | → Directional Arrow |
| ⊥ Metal Pole with Mastarm | ⊥ Metal Pole with Mastarm |
| N/A Guardrail | --- Guardrail |
| --- Directional Drill | N/A |
| ⊙ Left Arrow "ONLY" Sign (R3-5L) | ⊙ Left Arrow "ONLY" Sign (R3-5L) |
| ⊙ "YIELD" Sign (R1-2) | ⊙ "YIELD" Sign (R1-2) |
| ⊙ No U-Turn Sign (R3-4) | ⊙ No U-Turn Sign (R3-4) |
| ⊙ No U-Turn/No Left Turn Sign (R3-18) | ⊙ No U-Turn/No Left Turn Sign (R3-18) |
| ⊙ No Right Turn Sign (R3-1) | ⊙ No Right Turn Sign (R3-1) |

Signal Upgrade - Final Design

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

US 321 (N. Chester Street) at I-85 Northbound Ramp

Division 12 Gaston Co. Gastonia

PLAN DATE: September 2016 REVIEWED BY: T.R. Terrell

PREPARED BY: J.A. Wagner REVIEWED BY: N.R. Simmons

SCALE: 1" = 50'

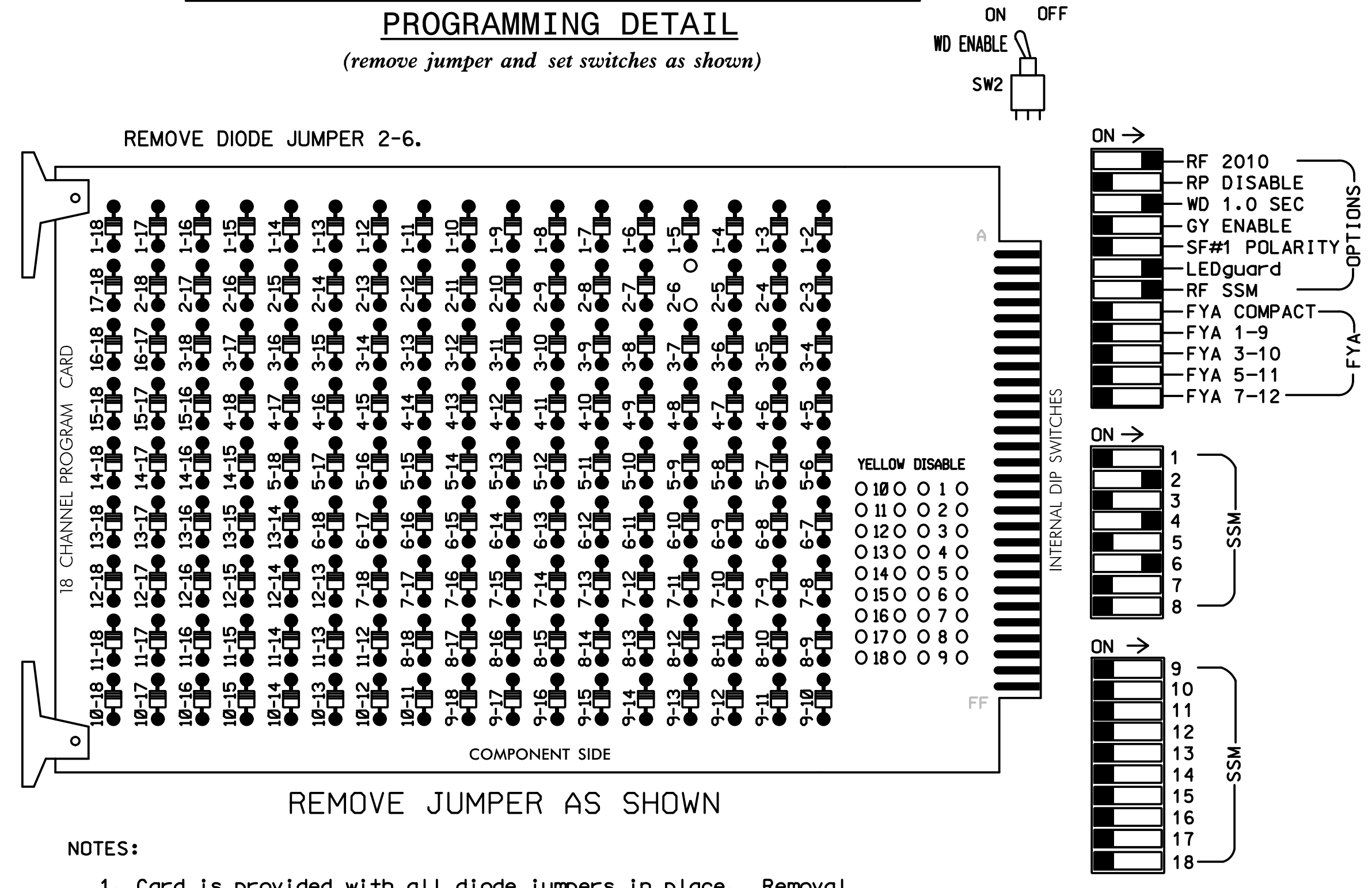
| REVISIONS | INIT. | DATE |
|-----------|-------|------|
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343 E. Six Forks Road, Suite 200
Raleigh, North Carolina 27609
NC License No: C-1554
(919) 546-8997

DocuSigned by: *W. Tasha R. Simmons* 12/16/2016
SIGNATURE DATE
SIG. INVENTORY NO. 12-0162

EDI MODEL 2018ECL-NC CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumper and set switches as shown)



NOTES:

1. Card is provided with all diode jumpers in place. Removal of any jumper allows its channels to run concurrently.
2. Ensure jumpers SEL2-SEL5 and SEL9 are present on the monitor board.
3. Ensure that Red Enable is active at all times during normal operation.
4. Connect serial cable from conflict monitor to comm. port 1 of 2070 controller. Ensure conflict monitor communicates with 2070.

NOTES

1. To prevent "flash-conflict" problems, insert red flash program blocks for all unused vehicle load switches in the output file. The installer shall verify that signal heads flash in accordance with the Signal Plans.
2. Enable Simultaneous Gap-Out for all phases.
3. Program phases 2 and 6 for Variable Initial and Gap Reduction.
4. Program phases 2 and 6 for Start Up In Green.
5. Program phases 2 and 6 for Yellow Flash.
6. The cabinet and controller are part of the Gastonia City Signal System.

EQUIPMENT INFORMATION

CONTROLLER.....2070
 CABINET.....332
 SOFTWARE.....ECONOLITE OASIS
 CABINET MOUNT.....BASE
 OUTPUT FILE POSITIONS...12
 LOAD SWITCHES USED.....S2,S5,S8
 PHASES USED.....2,4,6
 OVERLAPS.....NONE

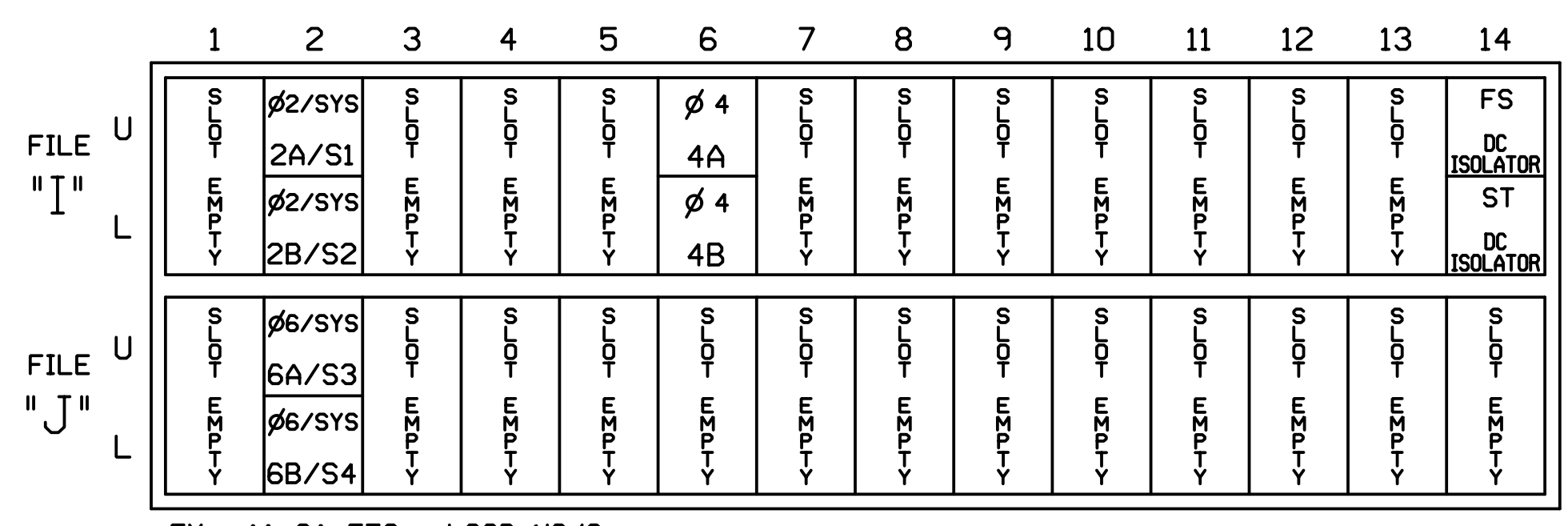
SIGNAL HEAD HOOK-UP CHART

| LOAD SWITCH NO. | S1 | S2 | S3 | S4 | S5 | S6 | S7 | S8 | S9 | S10 | S11 | S12 |
|-----------------|----|-------|-------|----|-------|-------|----|-------|-------|-----|-----|-------|
| CMU CHANNEL NO. | 1 | 2 | 13 | 3 | 4 | 14 | 5 | 6 | 15 | 7 | 8 | 16 |
| PHASE | 1 | 2 | 2 PED | 3 | 4 | 4 PED | 5 | 6 | 6 PED | 7 | 8 | 8 PED |
| SIGNAL HEAD NO. | NU | 21,22 | NU | NU | 41,42 | NU | NU | 61,62 | NU | NU | NU | NU |
| RED | | 128 | | | | | | 134 | | | | |
| YELLOW | | 129 | | | | | | 135 | | | | |
| GREEN | | 130 | | | | | | 136 | | | | |
| RED ARROW | | | | | 101 | | | | | | | |
| YELLOW ARROW | | | | | 102 | | | | | | | |
| GREEN ARROW | | | | | 103 | | | | | | | |
| Hand icon | | | | | | | | | | | | |
| Person icon | | | | | | | | | | | | |

NU = Not Used

INPUT FILE POSITION LAYOUT

(front view)



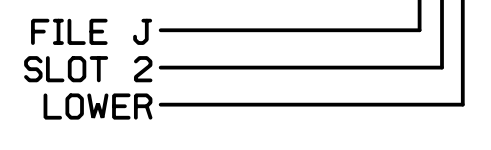
EX. : 1A, 2A, ETC. = LOOP NO.'S

FS = FLASH SENSE
 ST = STOP TIME
 PRE = PREEMPT

INPUT FILE CONNECTION & PROGRAMMING CHART

| LOOP NO. | LOOP TERMINAL | INPUT FILE POS. | PIN NO. | INPUT ASSIGNMENT NO. | DETECTOR NO. | NEMA PHASE | CALL | EXTEND | FULL TIME DELAY | STRETCH TIME | DELAY TIME |
|----------|---------------|-----------------|---------|----------------------|--------------|------------|------|--------|-----------------|--------------|------------|
| 2A/S1 | TB2-5,6 | I2U | 39 | 1 | 2 | 2/SYS | Y | Y | | | |
| 2B/S2 | TB2-7,8 | I2L | 43 | 5 | 12 | 2/SYS | Y | Y | | | |
| 4A | TB4-9,10 | I6U | 41 | 3 | 4 | 4 | Y | Y | | | |
| 4B | TB4-11,12 | I6L | 45 | 7 | 14 | 4 | Y | Y | | | |
| 6A/S3 | TB3-5,6 | J2U | 40 | 2 | 6 | 6/SYS | Y | Y | | | |
| 6B/S4 | TB3-7,8 | J2L | 44 | 6 | 16 | 6/SYS | Y | Y | | | |

INPUT FILE POSITION LEGEND: J2L



THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 12-0162
 DESIGNED: September 2016
 SEALED: 12-16-2016
 REVISED:

Signal Upgrade - Final Design

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

Prepared for

US 321 (N. Chester Street)
 at
 I-85 Northbound Ramp
 Division 12 Gaston Co. Gastonia
 PLAN DATE: September 2016 REVIEWED BY: T.R. Terrell
 PREPARED BY: J.A. Wagner REVIEWED BY: N.R. Simmons

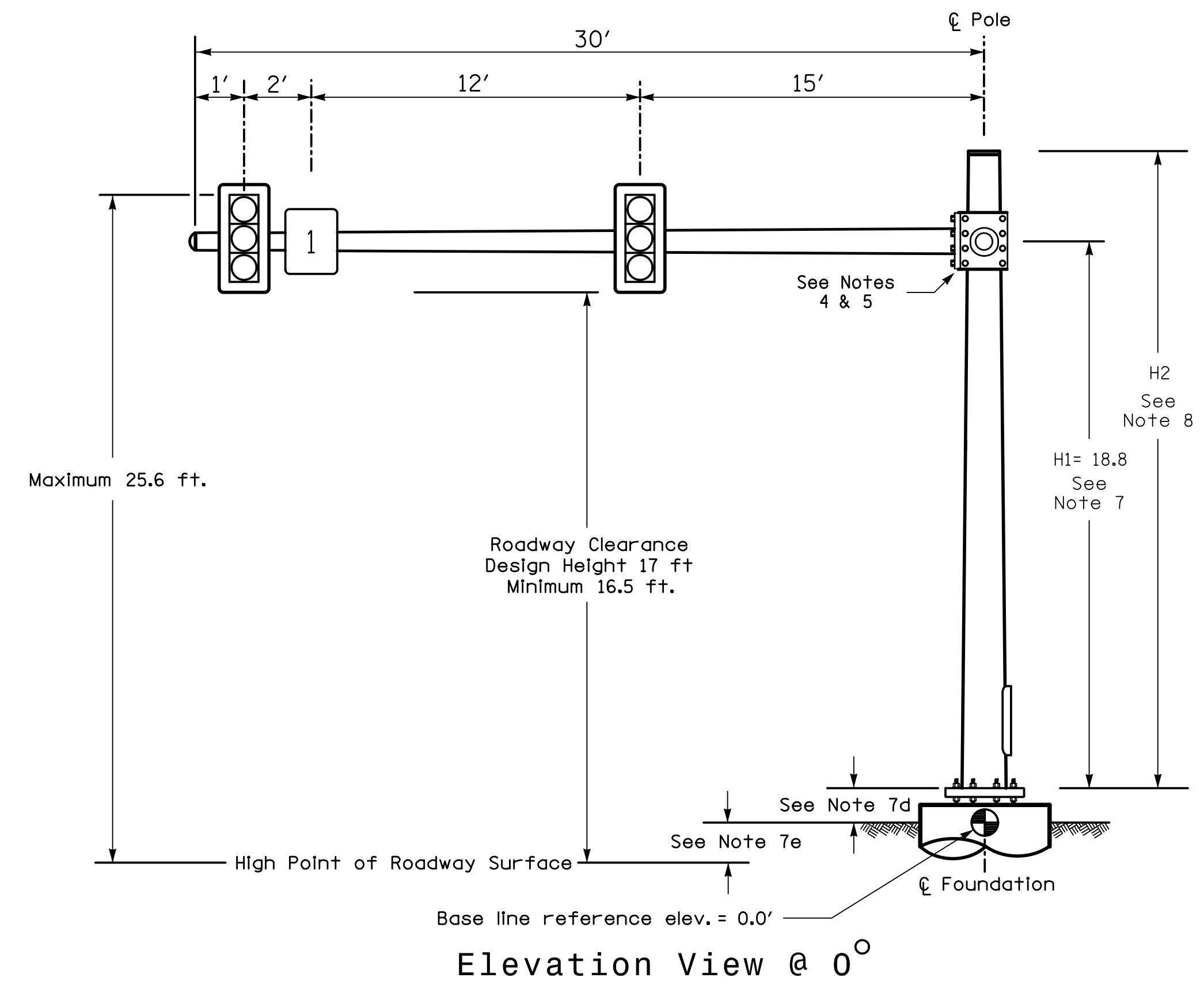
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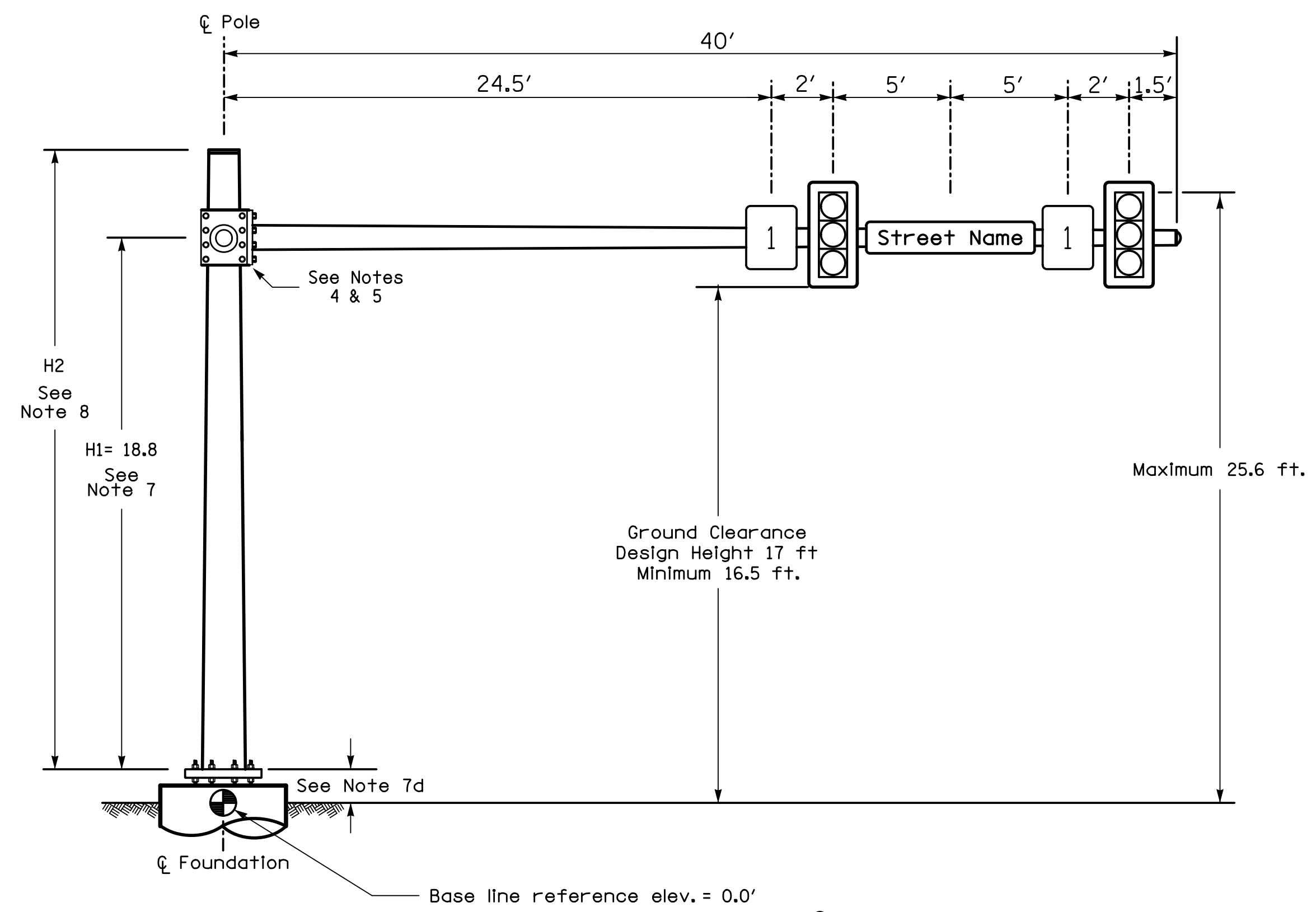
DocuSigned by: 12/16/2016
 SIGNATURE DATE
 SIG. INVENTORY NO. 12-0162

Design Loading for METAL POLE NO. 9, MAST ARM A



Elevation View @ 0°

Design Loading for METAL POLE NO. 9, MAST ARM B

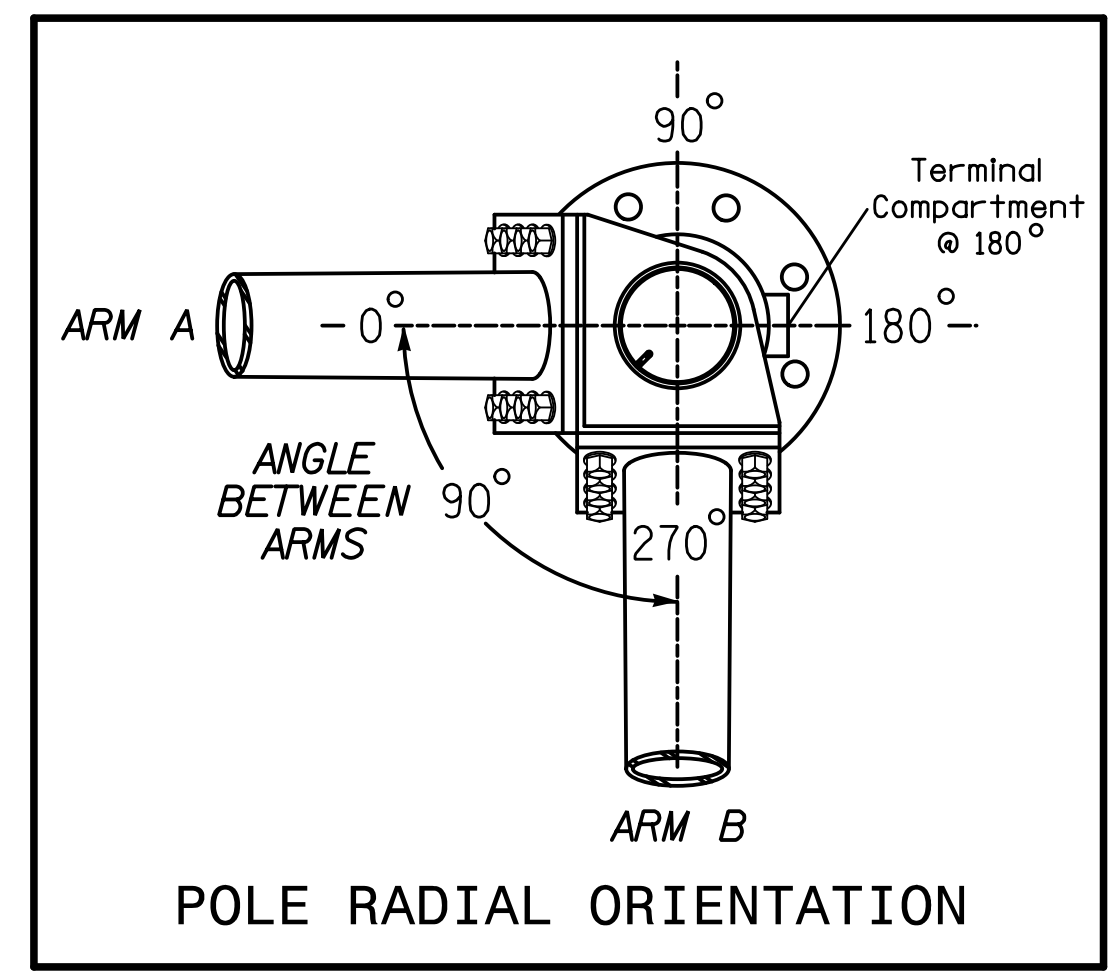


Elevation View @ 270°

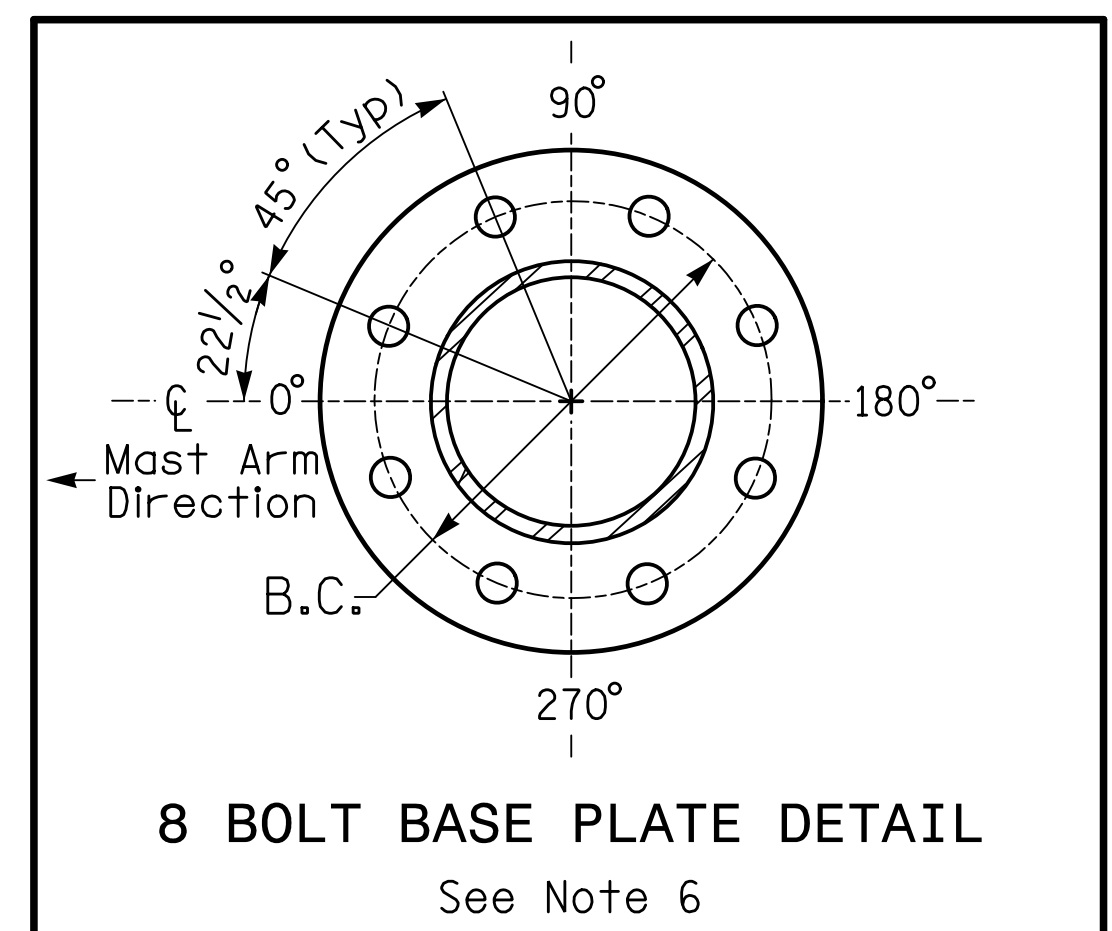
SPECIAL NOTE
The contractor is responsible for verifying that the mast arm attachment height (H1) will provide the "Design Height" clearance from the roadway before submitting final shop drawings for approval. Verify elevation data below which was obtained by field measurement or from available project survey data.

Elevation Data for Mast Arm Attachment (H1)

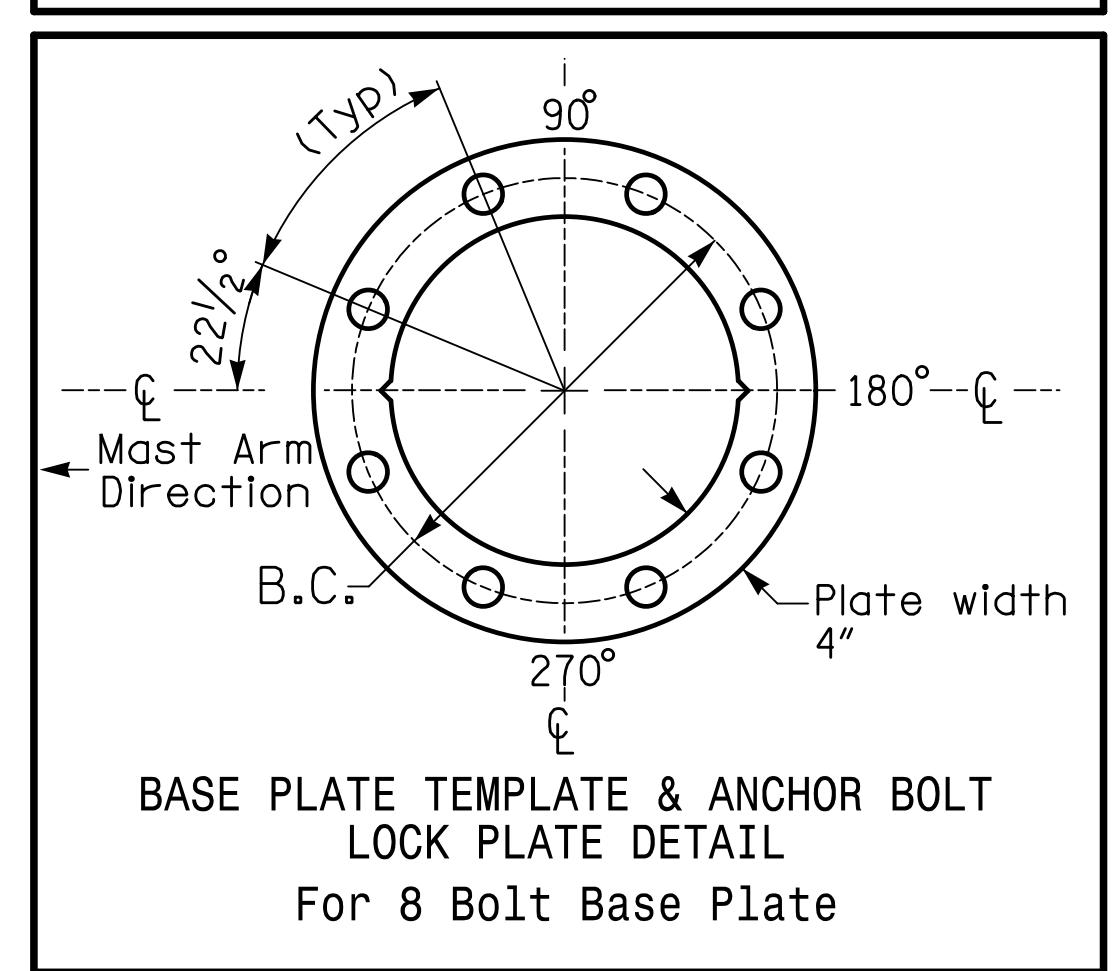
| Elevation Differences for: | ARM A | ARM B |
|--|-----------|---------|
| Baseline reference point at ϕ Foundation @ ground level | 0.0 ft. | 0.0 ft. |
| Elevation difference at High point of roadway surface | +0.34 ft. | +0.0 |
| Elevation difference at Edge of travelway or face of curb | +0.52 ft. | +0.0 |



POLE RADIAL ORIENTATION



8 BOLT BASE PLATE DETAIL
See Note 6



BASE PLATE TEMPLATE & ANCHOR BOLT LOCK PLATE DETAIL
For 8 Bolt Base Plate

HNTB HNTB NORTH CAROLINA, P.C.
343 E. Six Forks Road, Suite 200
Raleigh, North Carolina 27609
NC License No: C-1554
(919) 546-8997

METAL POLE No. 9

| | |
|-----------------------|-----------|
| PROJECT REFERENCE NO. | SHEET NO. |
| I-5000 | Sig. 21.2 |

MAST ARM LOADING SCHEDULE

| LOADING SYMBOL | DESCRIPTION | AREA | SIZE | WEIGHT |
|----------------|---|-----------|-------------------------|--------|
| | RIGID MOUNTED SIGNAL HEAD 12"-3 SECTION-WITH BACKPLATE | 9.3 S.F. | 25.5" W X 52.5" L | 60 LBS |
| 1 | SIGN RIGID MOUNTED | 5.0 S.F. | 24.0" W X 30.0" L | 11 LBS |
| | STREET NAME SIGN RIGID MOUNTED | 16.0 S.F. | 24.0" W X 96.0" L | 36 LBS |

NOTES

DESIGN REFERENCE MATERIAL

- Design the traffic signal structure and foundation in accordance with:
 - The 6th Edition 2013 AASHTO "Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals, including all of the latest interim revisions.
 - The 2012 NCDOT "Standard Specifications for Roads and Structures." The latest addenda to the specifications can be found in the traffic signal project special provisions.
 - The 2012 NCDOT Roadway Standard Drawings.
 - The traffic signal project plans and special provisions.
 - The NCDOT "Metal Pole Standards" located at the following NCDOT website: <https://connect.ncdot.gov/resources/safety/Pages/ITS-Design-Resources.aspx>

DESIGN REQUIREMENTS

- Design the traffic signal structure using the loading conditions shown in the elevation views. These are anticipated worst case "design loads" and may not represent the actual loads that will be applied at the time of the installation. The contractor should refer to the traffic signal plans for the actual loads that will be applied at the time of the installation.
- Design all signal supports using stress ratios that do not exceed 0.9.
- The camber design for the mast arm deflection should provide an appearance of a low pitched arch where the tip or the free end of the mast arm does not deflect below horizontal when fully loaded.
- A clamp-type bolted mast arm-to-pole connection may be used instead of the welded ring stiffened box connection shown as long as the connection meets all of the design requirements. This requires staggering the connections. Use elevation data for each arm to determine appropriate arm connection points.
- Design base plate with 8 anchor bolt holes. Provide 2 inch x 60 inch anchor bolts.
- The mast arm attachment height (H1) shown is based on the following design assumptions:
 - Mast arm slope and deflection are not considered in determining the arm attachment height as they are assumed to offset each other.
 - Signal heads are rigidly mounted and vertically centered on the mast arm.
 - The roadway clearance height for design is as shown in the elevation views.
 - The top of the pole base plate is 0.75 feet above the ground elevation.
 - Refer to the Elevation Data Chart for the elevation differences between the proposed foundation ground level and the high point of the roadway.
- The pole manufacturer will determine the total height (H2) of each pole using the greater of the following:
 - Mast arm attachment height (H1) plus 2 feet, or
 - H1 plus 1/2 of the total height of the mast arm attachment assembly plus 1 foot.
- If pole location adjustments are required, the contractor must gain approval from the Engineer as this may affect the mast arm lengths and arm attachment heights. The contractor may contact the Signal Design Section Senior Structural Engineer for assistance at (919) 773-2800.
- The contractor is responsible for verifying that the mast arm length shown will allow proper positioning of the signal heads over the roadway.
- The contractor is responsible for providing soil penetration testing data (SPT) to the pole manufacturer so site specific foundations can be designed.

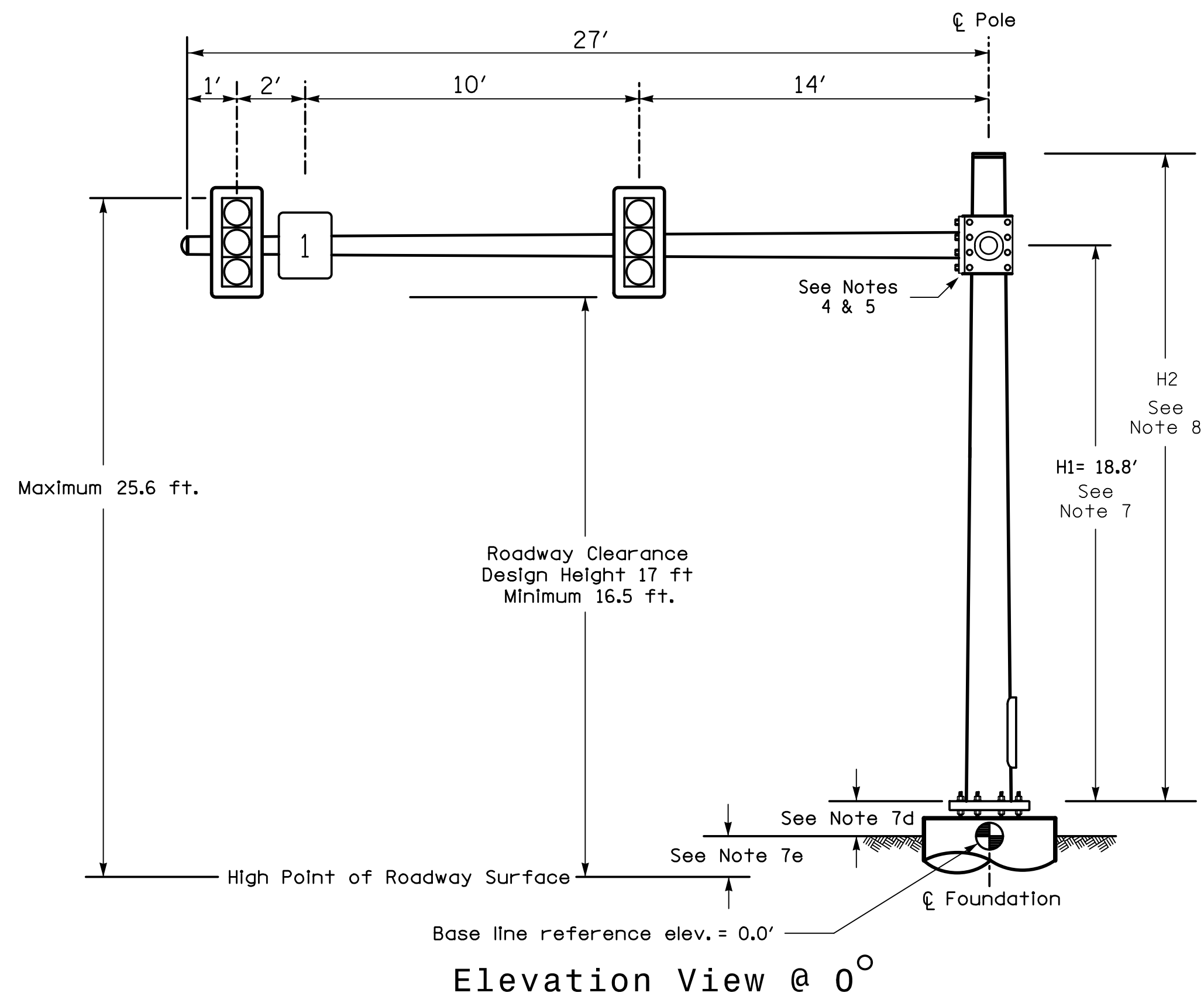
All metal poles and arms should be black in color as specified in the project special provisions.

NCDOT Wind Zone 4 (90 mph)

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

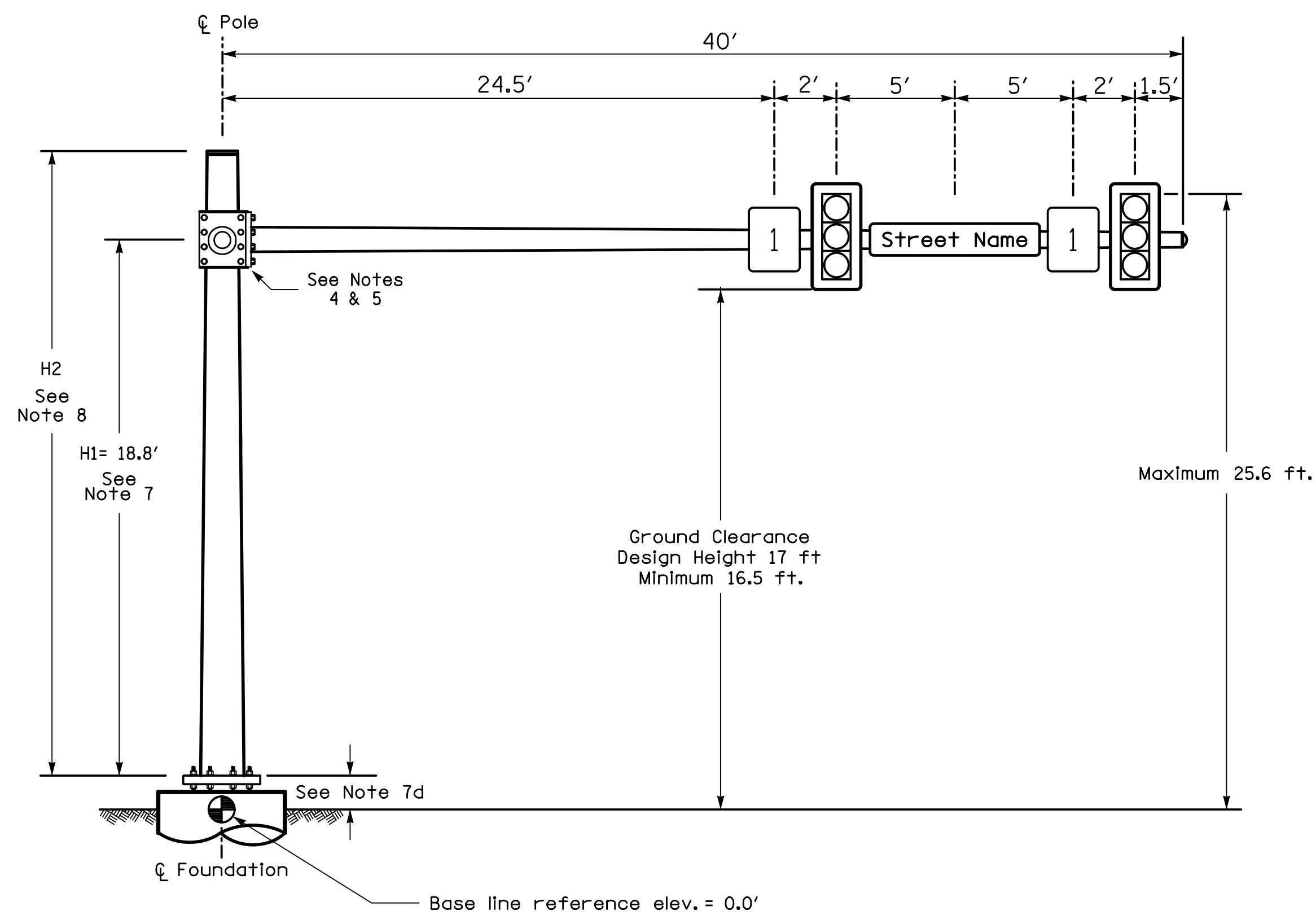
| | | |
|--|---|--|
| Prepared For TRANSPORTATION MOBILITY AND SAFETY DIVISION DIVISION OF NORTH CAROLINA STATE OF NORTH CAROLINA Signal Design Section 750 N. Greenfield Place, Garner, NC 27529 | US 321 (N. Chester Street) at I-85 Northbound Ramp Division 12 Gaston Co. Gastonia PLAN DATE: September 2016 REVIEWED BY: A.D. Klinksiek PREPARED BY: T.R. Terrell REVIEWED BY: N.R. Simmons | SEAL SEAL 031464 ENGINEER NATASHA R. SIMMONS |
| | SCALE NONE | REVISIONS INIT. DATE |

Design Loading for METAL POLE NO. 9, MAST ARM A



Elevation View @ 0°

Design Loading for METAL POLE NO. 9, MAST ARM B



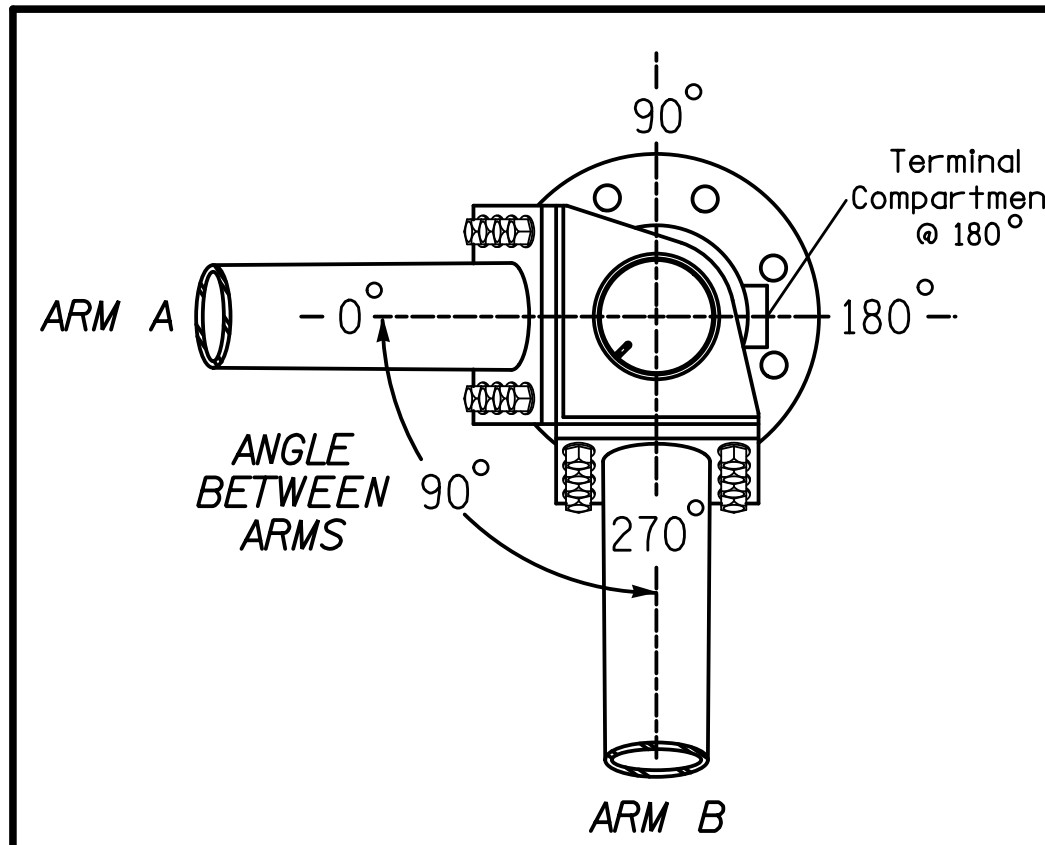
Elevation View @ 270°

SPECIAL NOTE

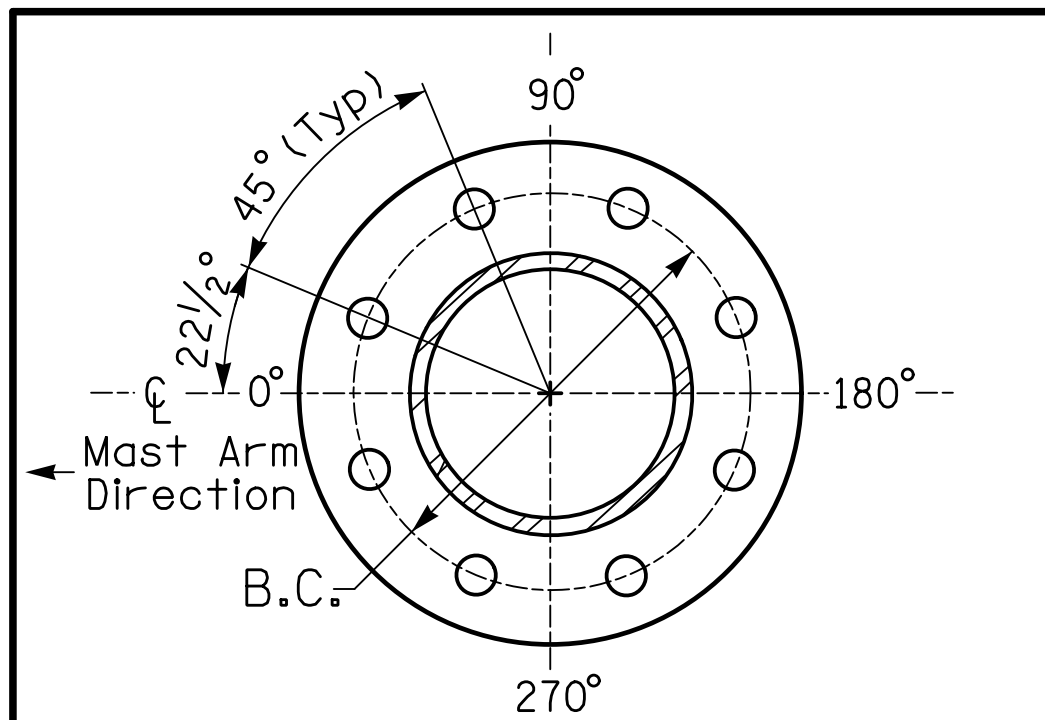
The contractor is responsible for verifying that the mast arm attachment height (H1) will provide the "Design Height" clearance from the roadway before submitting final shop drawings for approval. Verify elevation data below which was obtained by field measurement or from available project survey data.

Elevation Data for Mast Arm Attachment (H1)

| Elevation Differences for: | ARM A | ARM B |
|---|-----------|---------|
| Baseline reference point at Foundation @ ground level | 0.0 ft. | 0.0 ft. |
| Elevation difference at High point of roadway surface | +0.41 ft. | +0.0 |
| Elevation difference at Edge of travelway or face of curb | -0.11 ft. | +0.0 |

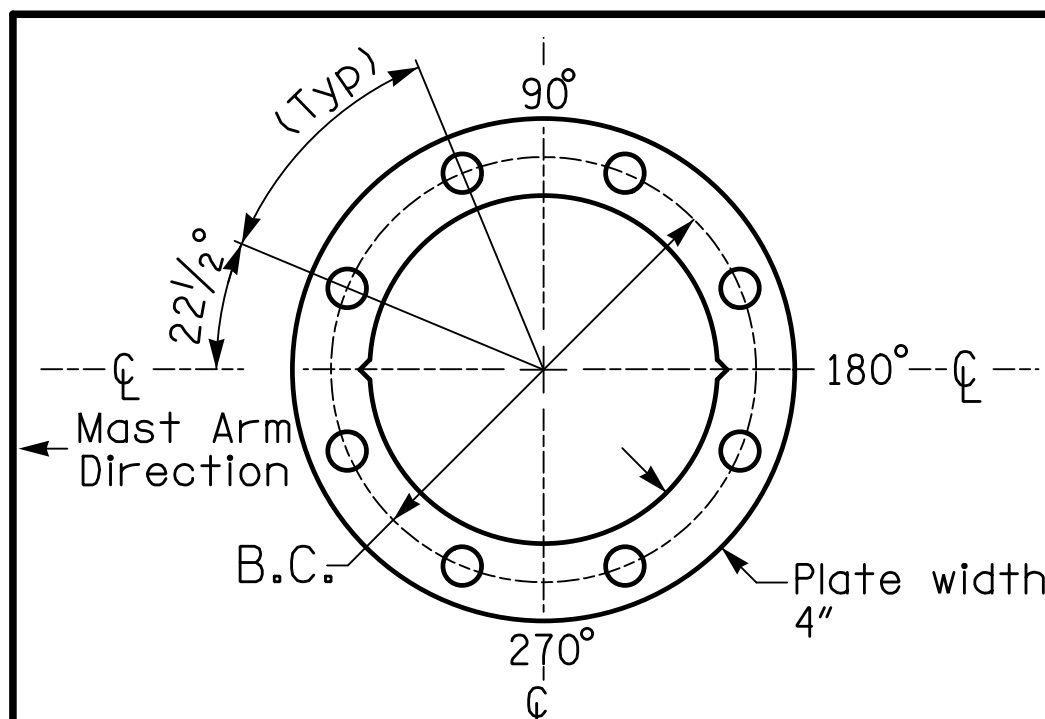


POLE RADIAL ORIENTATION



8 BOLT BASE PLATE DETAIL

See Note 6



BASE PLATE TEMPLATE & ANCHOR BOLT LOCK PLATE DETAIL For 8 Bolt Base Plate

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343 E. Six Forks Road, Suite 200
Raleigh, North Carolina 27609
NC License No: C-1554
(919) 546-8997

METAL POLE No. 9

| | |
|-----------------------|-----------|
| PROJECT REFERENCE NO. | SHEET NO. |
| I-5000 | Sig. 21.2 |

MAST ARM LOADING SCHEDULE

| LOADING SYMBOL | DESCRIPTION | AREA | SIZE | WEIGHT |
|----------------|--|-----------|-------------------|--------|
| | RIGID MOUNTED SIGNAL HEAD 12"-3 SECTION-WITH BACKPLATE | 9.3 S.F. | 25.5" W X 52.5" L | 60 LBS |
| 1 | SIGN RIGID MOUNTED | 5.0 S.F. | 24.0" W X 30.0" L | 11 LBS |
| | STREET NAME SIGN RIGID MOUNTED | 16.0 S.F. | 24.0" W X 96.0" L | 36 LBS |

NOTES

DESIGN REFERENCE MATERIAL

- Design the traffic signal structure and foundation in accordance with: The 6th Edition 2013 AASHTO "Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals, including all of the latest interim revisions. The 2012 NCDOT "Standard Specifications for Roads and Structures." The latest addenda to the specifications can be found in the traffic signal project special provisions. The 2012 NCDOT Roadway Standard Drawings. The traffic signal project plans and special provisions. The NCDOT "Metal Pole Standards" located at the following NCDOT website: <https://connect.ncdot.gov/resources/safety/Pages/ITS-Design-Resources.aspx>

DESIGN REQUIREMENTS

- Design the traffic signal structure using the loading conditions shown in the elevation views. These are anticipated worst case "design loads" and may not represent the actual loads that will be applied at the time of the installation. The contractor should refer to the traffic signal plans for the actual loads that will be applied at the time of the installation.
- Design all signal supports using stress ratios that do not exceed 0.9.
- The camber design for the mast arm deflection should provide an appearance of a low pitched arch where the tip or the free end of the mast arm does not deflect below horizontal when fully loaded.
- A clamp-type bolted mast arm-to-pole connection may be used instead of the welded ring stiffened box connection shown as long as the connection meets all of the design requirements. This requires staggering the connections. Use elevation data for each arm to determine appropriate arm connection points.
- Design base plate with 8 anchor bolt holes. Provide 2 inch x 60 inch anchor bolts.
- The mast arm attachment height (H1) shown is based on the following design assumptions:
 - Mast arm slope and deflection are not considered in determining the arm attachment height as they are assumed to offset each other.
 - Signal heads are rigidly mounted and vertically centered on the mast arm.
 - The roadway clearance height for design is as shown in the elevation views.
 - The top of the pole base plate is 0.75 feet above the ground elevation.
 - Refer to the Elevation Data Chart for the elevation differences between the proposed foundation ground level and the high point of the roadway.
- The pole manufacturer will determine the total height (H2) of each pole using the greater of the following:
 - Mast arm attachment height (H1) plus 2 feet, or
 - H1 plus 1/2 of the total height of the mast arm attachment assembly plus 1 foot.
- If pole location adjustments are required, the contractor must gain approval from the Engineer as this may affect the mast arm lengths and arm attachment heights. The contractor may contact the Signal Design Section Senior Structural Engineer for assistance at (919) 773-2800.
- The contractor is responsible for verifying that the mast arm length shown will allow proper positioning of the signal heads over the roadway.
- The contractor is responsible for providing soil penetration testing data (SPT) to the pole manufacturer so site specific foundations can be designed.

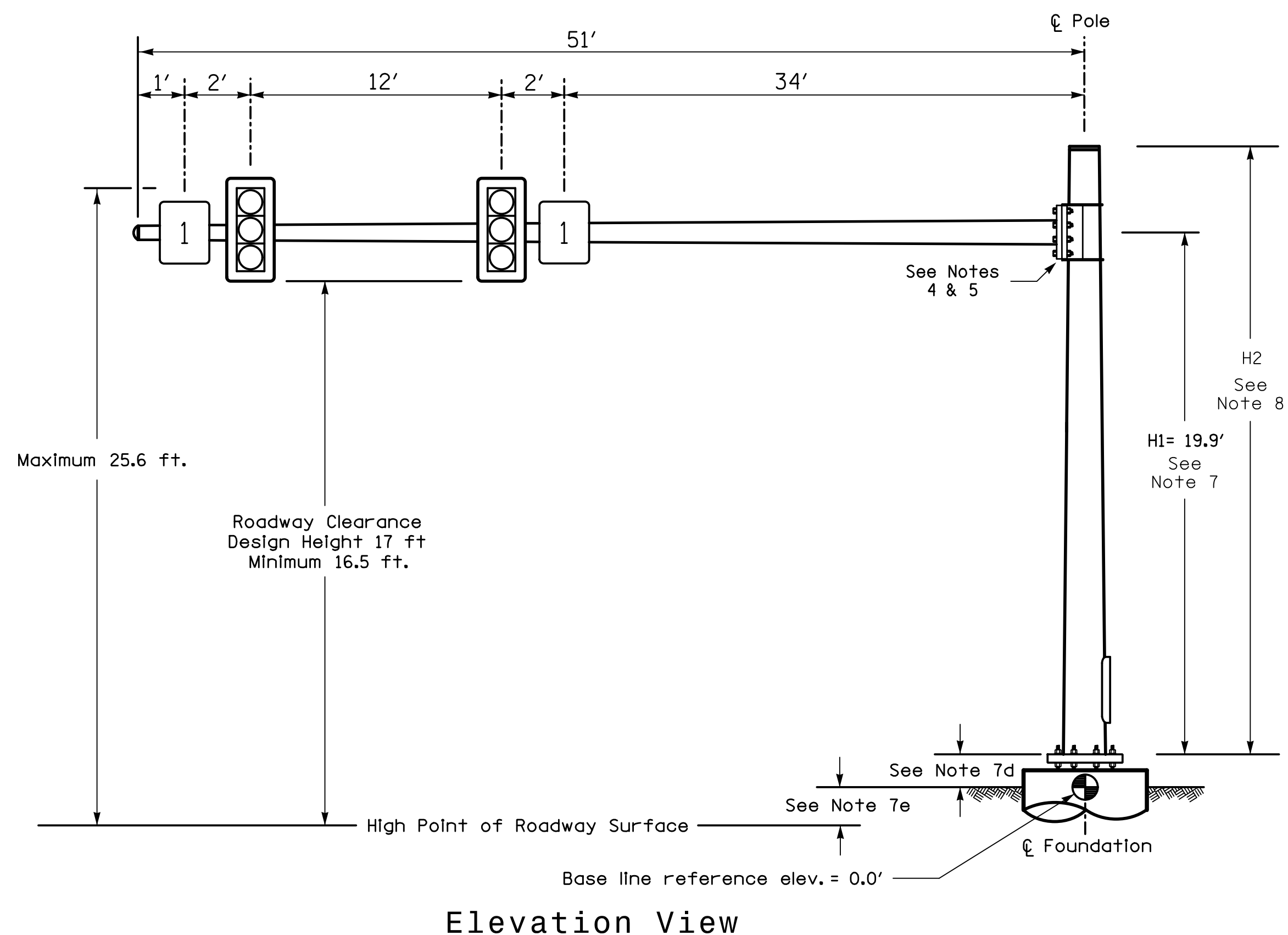
All metal poles and arms should be black in color as specified in the project special provisions.

NCDOT Wind Zone 4 (90 mph)

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

| | | |
|---|---|--|
| Prepared For TRANSPORTATION MOBILITY AND SAFETY DIVISION STATE OF NORTH CAROLINA SIGNAL DESIGN SECTION 750 N. Greenfield Pkwy, Garner, NC 27529 | US 321 (N. Chester Street) at I-85 Northbound Ramp Division 12 Gaston Co. Gastonia PLAN DATE: September 2016 REVIEWED BY: A.D. Klinksiek PREPARED BY: T.R. Terrell REVIEWED BY: N.R. Simmons | SEAL SEAL 031464 NATASHA R. SIMMONS ENGINEER |
| | SCALE NONE | REVISIONS INIT. DATE |

Design Loading for METAL POLE NO. 10

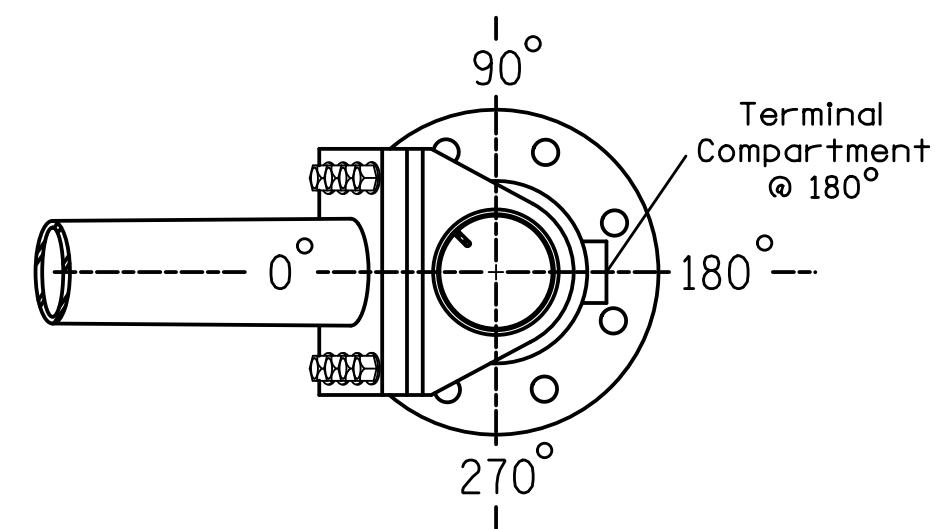


SPECIAL NOTE

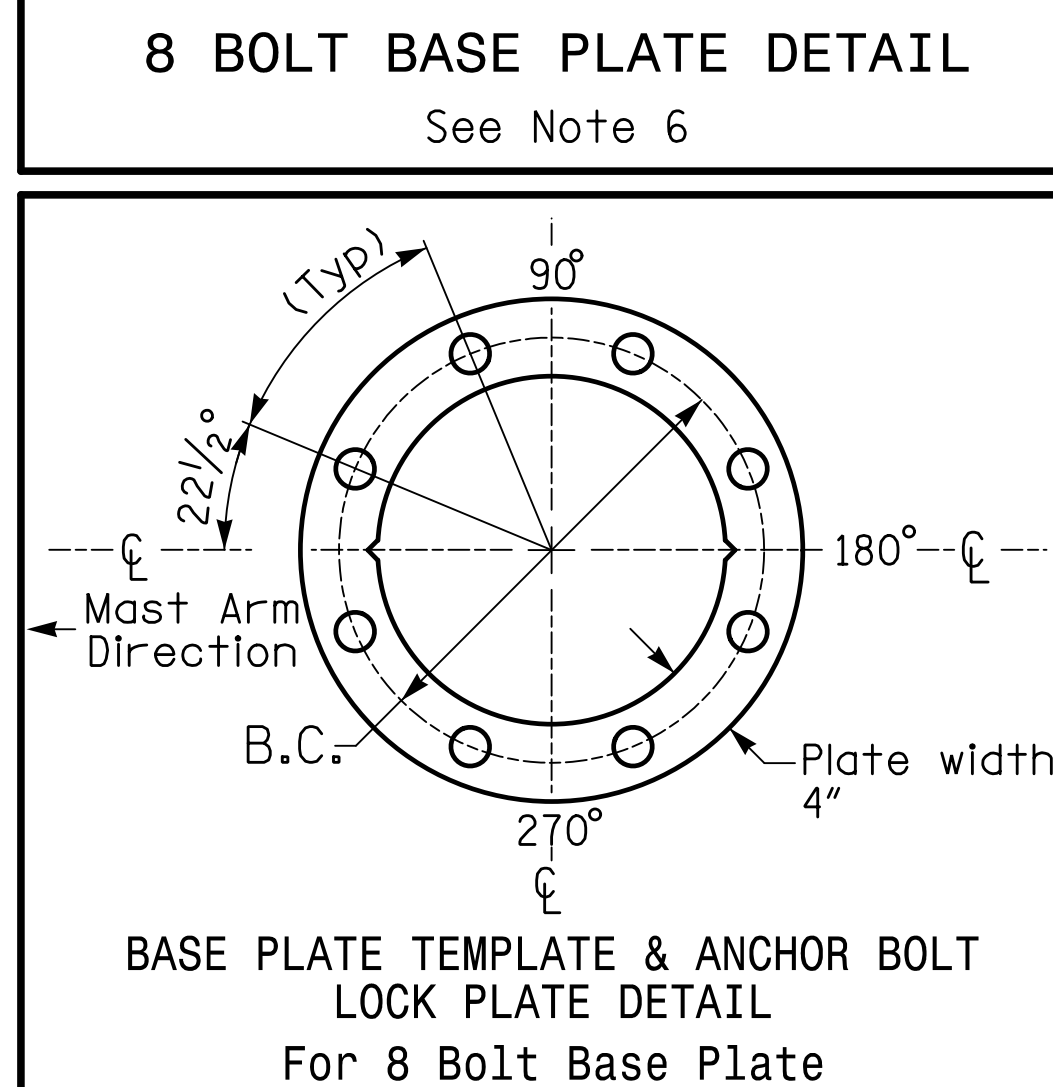
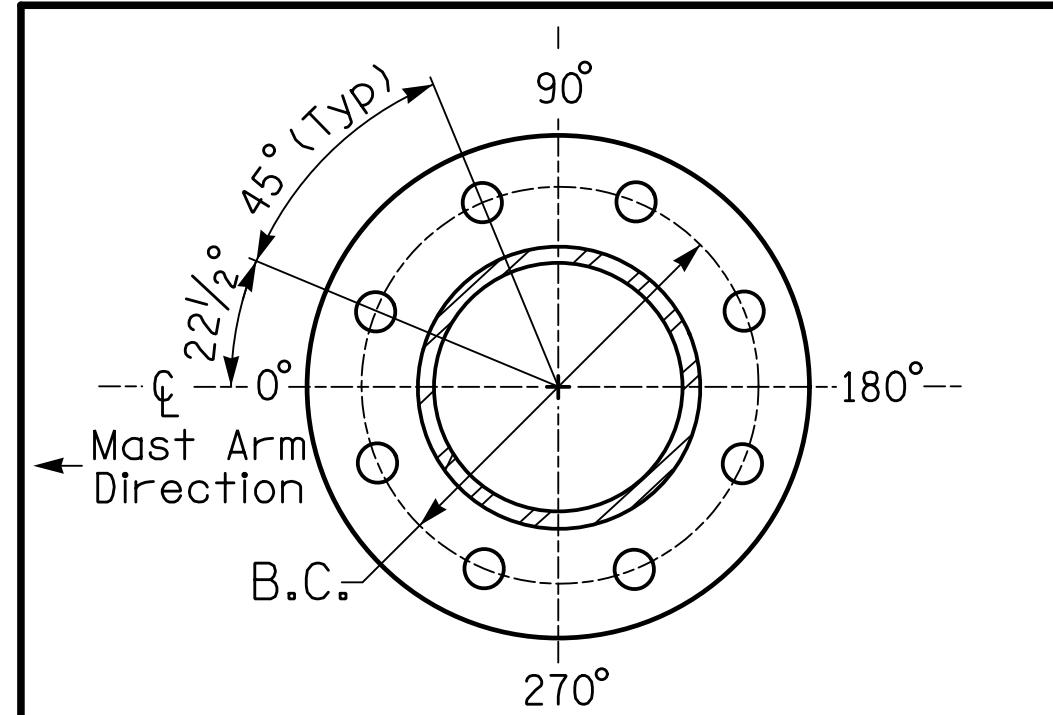
The contractor is responsible for verifying that the mast arm attachment height (H1) will provide the "Design Height" clearance from the roadway before submitting final shop drawings for approval. Verify elevation data below which was obtained by field measurement or from available project survey data.

Elevation Data for Mast Arm Attachment (H1)

| Elevation Differences for: | | Pole 10 |
|--|--------|-----------|
| Baseline reference point at ϕ Foundation @ ground level | ϕ | 0.0 ft. |
| Elevation difference at High point of roadway surface | | +1.76 ft. |
| Elevation difference at Edge of travelway or face of curb | | +0.92 ft. |



POLE RADIAL ORIENTATION



METAL POLE No. 10

| PROJECT REFERENCE NO. | SHEET NO. |
|-----------------------|-----------|
| I-5000 | Fig. 21.3 |

MAST ARM LOADING SCHEDULE

| LOADING SYMBOL | DESCRIPTION | AREA | SIZE | WEIGHT |
|----------------|---|----------|-------------------------|--------|
| | RIGID MOUNTED SIGNAL HEAD 12"-3 SECTION-WITH BACKPLATE | 9.3 S.F. | 25.5" W X 52.5" L | 60 LBS |
| | SIGN RIGID MOUNTED | 5.0 S.F. | 24.0" W X 30.0" L | 11 LBS |

NOTES

DESIGN REFERENCE MATERIAL

- Design the traffic signal structure and foundation in accordance with:
 - The 6th Edition 2013 AASHTO "Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals, including all of the latest interim revisions.
 - The 2012 NCDOT "Standard Specifications for Roads and Structures." The latest addenda to the specifications can be found in the traffic signal project special provisions.
 - The 2012 NCDOT Roadway Standard Drawings.
 - The traffic signal project plans and special provisions.
 - The NCDOT "Metal Pole Standards" located at the following NCDOT website: <https://connect.ncdot.gov/resources/safety/Pages/ITS-Design-Resources.aspx>

DESIGN REQUIREMENTS

- Design the traffic signal structure using the loading conditions shown in the elevation views. These are anticipated worst case "design loads" and may not represent the actual loads that will be applied at the time of the installation. The contractor should refer to the traffic signal plans for the actual loads that will be applied at the time of the installation.
- Design all signal supports using stress ratios that do not exceed 0.9.
- The camber design for the mast arm deflection should provide an appearance of a low pitched arch where the tip or the free end of the mast arm does not deflect below horizontal when fully loaded.
- A clamp-type bolted mast arm-to-pole connection may be used instead of the welded ring stiffened box connection shown as long as the connection meets all of the design requirements.
- Design base plate with 8 anchor bolt holes. Provide 2 inch x 60 inch anchor bolts.
- The mast arm attachment height (H1) shown is based on the following design assumptions:
 - Mast arm slope and deflection are not considered in determining the arm attachment height as they are assumed to offset each other.
 - Signal heads are rigidly mounted and vertically centered on the mast arm.
 - The roadway clearance height for design is as shown in the elevation views.
 - The top of the pole base plate is 0.75 feet above the ground elevation.
 - Refer to the Elevation Data Chart for the elevation differences between the proposed foundation ground level and the high point of the roadway.
- The pole manufacturer will determine the total height (H2) of each pole using the greater of the following:
 - Mast arm attachment height (H1) plus 2 feet, or
 - H1 plus 1/2 of the total height of the mast arm attachment assembly plus 1 foot.
- If pole location adjustments are required, the contractor must gain approval from the Engineer as this may affect the mast arm lengths and arm attachment heights. The contractor may contact the Signal Design Section Senior Structural Engineer for assistance at (919) 773-2800.
- The contractor is responsible for verifying that the mast arm length shown will allow proper positioning of the signal heads over the roadway.
- The contractor is responsible for providing soil penetration testing data (SPT) to the pole manufacturer so site specific foundations can be designed.

All metal poles and arms should be black in color as specified in the project special provisions.

NCDOT Wind Zone 4 (90 mph)

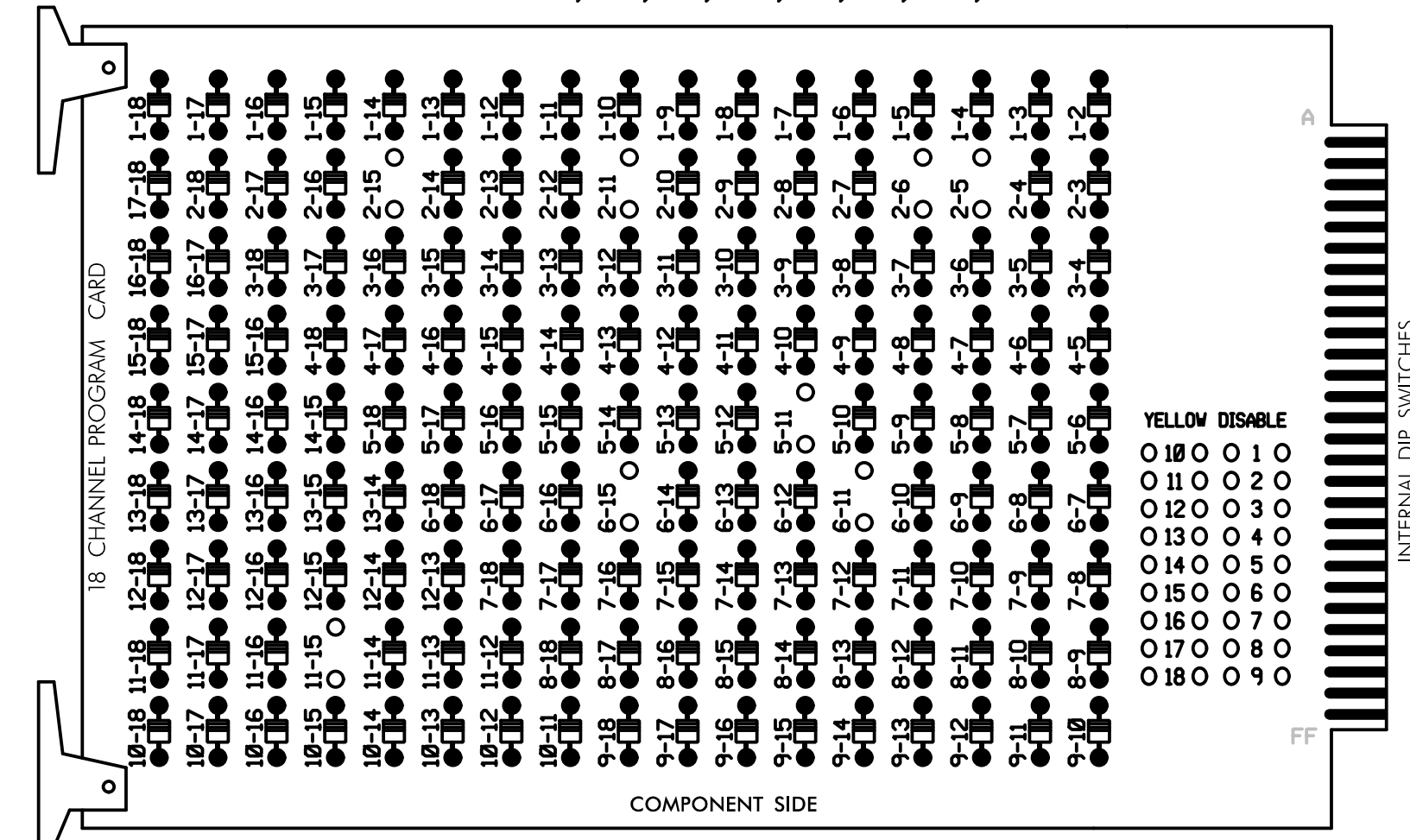
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

| | | | |
|---------------------|--|--|--------------------|
| | US 321 (N. Chester Street) at I-85 Northbound Ramp | | |
| | Division 12 Gaston Co. Gastonia | PLAN DATE: September 2016 REVIEWED BY: A.D. Klinksiek PREPARED BY: T.R. Terrell REVIEWED BY: N.R. Simmons | |
| SCALE 0 NONE N/A | REVISIONS INIT. DATE | SIGNATURE | DATE 12/16/2016 |

EDI MODEL 2018ECL-NC CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)

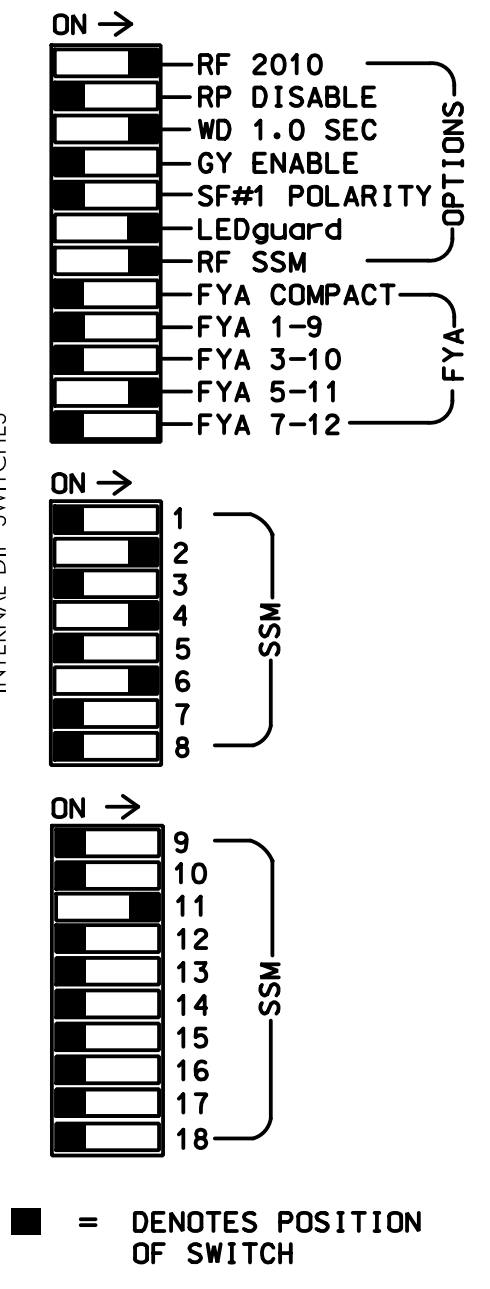
REMOVE DIODE JUMPERS 2-5, 2-6, 2-11, 2-15, 5-11, 6-11, 6-15, and 11-15.



REMOVE JUMPERS AS SHOWN

NOTES:

- Card is provided with all diode jumpers in place. Removal of any jumper allows its channels to run concurrently.
- Ensure jumpers SEL2-SEL5 and SEL9 are present on the monitor board.
- Ensure that Red Enable is active at all times during normal operation.
- Connect serial cable from conflict monitor to comm. port 1 of 2070 controller. Ensure conflict monitor communicates with 2070.



■ = DENOTES POSITION OF SWITCH

NOTES

- To prevent "flash-conflict" problems, insert red flash program blocks for all unused vehicle load switches in the output file. The installer shall verify that signal heads flash in accordance with the Signal Plans.
- Enable Simultaneous Gap-Out for all phases.
- Program phases 2 and 6 for Variable Initial and Gap Reduction.
- Program phases 2 and 6 for Start Up In Green.
- Program phase 6 for 'STARTUP PED CALL'.
- Program phases 2 and 6 for Yellow Flash.
- The cabinet and controller are part of the Gastonia City Signal System.

EQUIPMENT INFORMATION

CONTROLLER.....2070
 CABINET.....332 W/ AUX
 SOFTWARE.....ECONOLITE OASIS
 CABINET MOUNT.....BASE
 OUTPUT FILE POSITIONS...18 WITH AUX. OUTPUT FILE
 LOAD SWITCHES USED.....S2,S5,S7,S8,S9,AUX S4
 PHASES USED.....2,4,5,6,6PED
 OVERLAP "A".....NOT USED
 OVERLAP "B".....NOT USED
 OVERLAP "C".....5+6
 OVERLAP "D".....NOT USED

SIGNAL HEAD HOOK-UP CHART

| LOAD SWITCH NO. | S1 | S2 | S3 | S4 | S5 | S6 | S7 | S8 | S9 | S10 | S11 | S12 | AUX S1 | AUX S2 | AUX S3 | AUX S4 | AUX S5 | AUX S6 | |
|-----------------------|----|-------|-------|----|-------|-------|----|-------|----------|-----|-----|-------|--------|--------|--------|--------|--------|--------|------|
| CHU CHANNEL NO. | 1 | 2 | 13 | 3 | 4 | 14 | 5 | 6 | 15 | 7 | 8 | 16 | 9 | 10 | 17 | 11 | 12 | 18 | |
| PHASE | 1 | 2 | 2 PED | 3 | 4 | 4 PED | 5 | 6 | 6 PED | 7 | 8 | 8 PED | OLA | OLB | SPARE | OLC | OLD | SPARE | |
| SIGNAL HEAD NO. | NU | 21,22 | NU | NU | 41,42 | NU | 51 | 61,62 | P61, P62 | NU | NU | NU | NU | NU | NU | 51 | NU | NU | |
| RED | | 128 | | | 101 | | | 134 | | | | | | | | | | | |
| YELLOW | | 129 | | | 102 | | * | 135 | | | | | | | | | | | |
| GREEN | | 130 | | | 103 | | | 136 | | | | | | | | | | | |
| RED ARROW | | | | | | | | | | | | | | | | | | A114 | |
| YELLOW ARROW | | | | | | | | | | | | | | | | | | | A115 |
| FLASHING YELLOW ARROW | | | | | | | | | | | | | | | | | | | A116 |
| GREEN ARROW | | | | | | | | 133 | | | | | | | | | | | |
| Hand icon | | | | | | | | | 119 | | | | | | | | | | |
| Person icon | | | | | | | | | | 121 | | | | | | | | | |

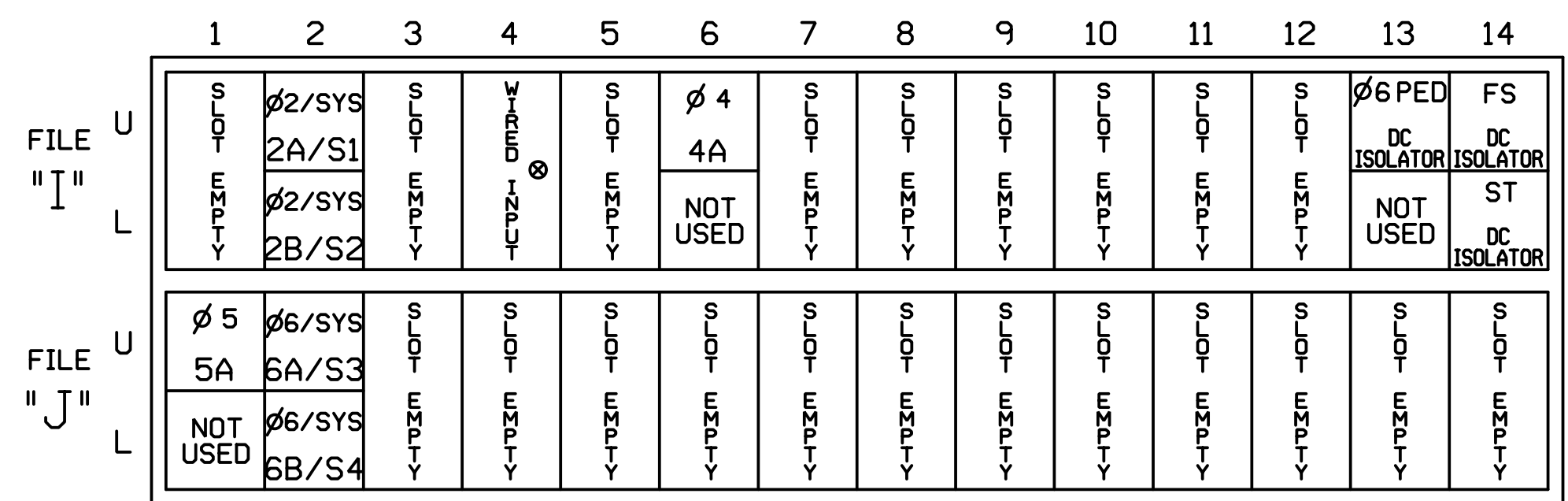
NU = Not Used

* Denotes install load resistor. See load resistor installation detail this sheet.

★ See pictorial of head wiring in detail below.

INPUT FILE POSITION LAYOUT

(front view)



EX.: 1A, 2A, ETC. = LOOP NO.'S

FS = FLASH SENSE
 ST = STOP TIME

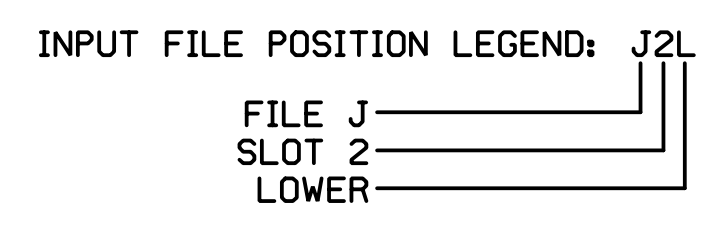
⊗ Wired Input - Do not populate slot with detector card

INPUT FILE CONNECTION & PROGRAMMING CHART

| LOOP NO. | LOOP TERMINAL | INPUT FILE POS. | PIN NO. | INPUT ASSIGNMENT NO. | DETECTOR NO. | NEMA PHASE | CALL | EXTEND | FULL TIME DELAY | STRETCH TIME | DELAY TIME |
|------------------|---------------|-----------------|---------|----------------------|--------------|------------|------|--------|-----------------|--------------|------------|
| 2A/S1 | TB2-5,6 | I2U | 39 | 1 | 2 | 2/SYS | Y | Y | | | |
| 2B/S2 | TB2-7,8 | I2L | 43 | 5 | 12 | 2/SYS | Y | Y | | | |
| 4A | TB4-9,10 | I6U | 41 | 3 | 4 | 4 | Y | Y | | | 10 |
| 5A ¹ | TB3-1,2 | J1U | 55 | 17 | 5 | 5 | Y | Y | | | 15 |
| | - | I4U | 47 | 9 | 22 | 2 | Y | Y | Y | | 3 |
| 6A/S3 | TB3-5,6 | J2U | 40 | 2 | 6 | 6/SYS | Y | Y | | | |
| 6B/S4 | TB3-7,8 | J2L | 44 | 6 | 16 | 6/SYS | Y | Y | | | |
| PED PUSH BUTTONS | | | | | | | | | | | |
| P61,P62 | TB8-7,9 | I13U | 68 | 30 | PED 6 | 6 PED | | | | | |

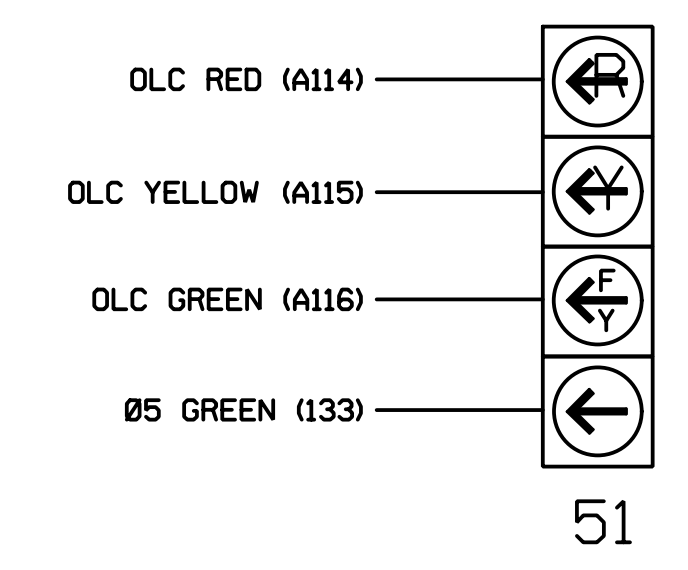
NOTE:
 INSTALL DC ISOLATORS IN INPUT FILE SLOT 113.

¹Add jumper from J1-W to I4-W, on rear of input file.



FYA SIGNAL WIRING DETAIL

(wire signal heads as shown)



NOTE

The sequence display for signal head 51 requires special logic programming. See sheet 2 for programming instructions.

COUNTDOWN PEDESTRIAN SIGNAL OPERATION

Countdown Ped Signals are required to display timing only during Ped Clearance Interval. Consult Ped Signal Module user's manual for instructions on selecting this feature.

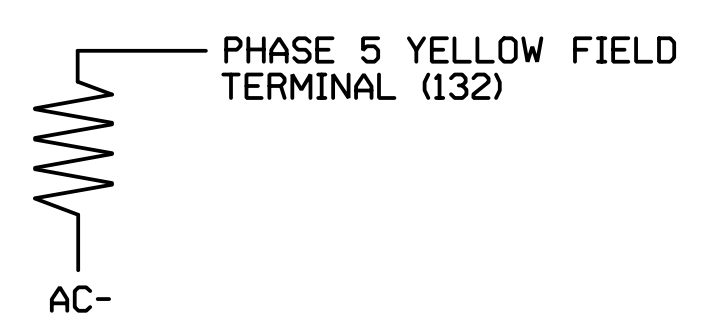
Temporary Signal - Phase 1, Step 1
 (Sheet 1 of 2)

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

LOAD RESISTOR INSTALLATION DETAIL

(install resistor as shown below)

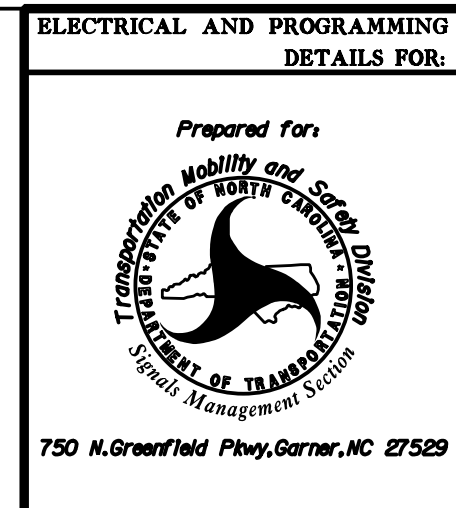
| ACCEPTABLE VALUES | |
|-------------------|-----------|
| VALUE (ohms) | WATTAGE |
| 1.5K - 1.9K | 25W (min) |
| 2.0K - 3.0K | 10W (min) |



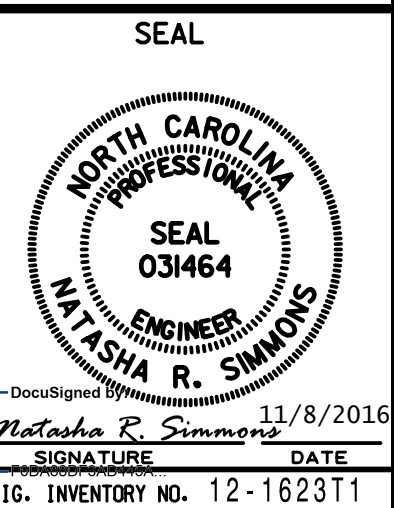
THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 12-1623T1
 DESIGNED: September 2016
 SEALED: 11-08-2016
 REVISED:



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 343 E. Six Forks Road, Suite 200
 Raleigh, North Carolina 27609
 NC License No: C-1554
 (919) 546-8997



US 321 (N. Chester Street)
 at
 Radio Street
 Division 12 Gaston Co. Gastonia
 PLAN DATE: September 2016 REVIEWED BY: T.R. Terrell
 PREPARED BY: J.A. Wagner REVIEWED BY: N.R. Simmons



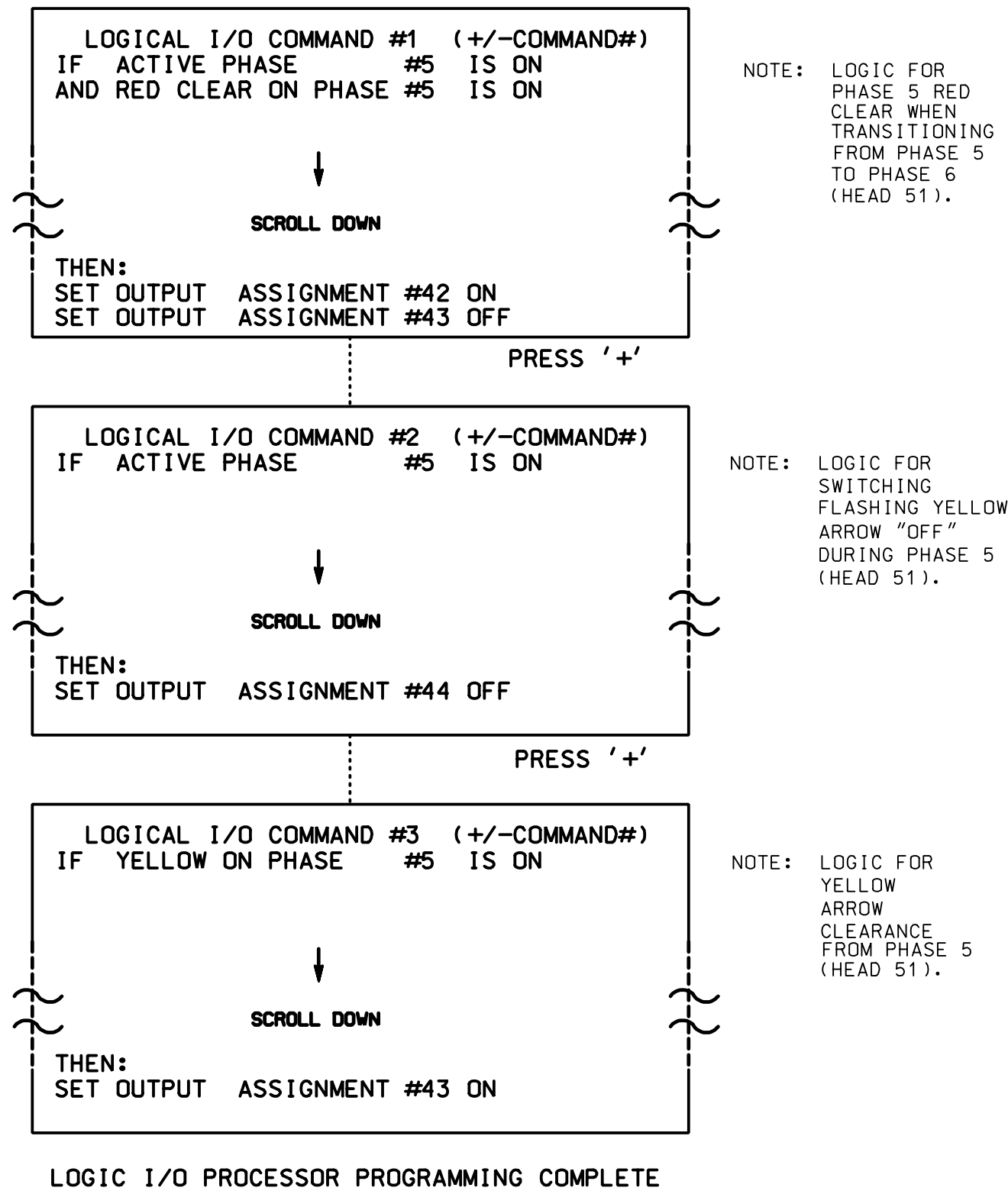
| REVISIONS | INIT. | DATE |
|-----------|-------|------|
| | | |

11/8/2016
 Signature: Natasha R. Simmons
 DATE: 11/8/2016
 SIG. INVENTORY NO. 12-1623T1

LOGICAL I/O PROCESSOR PROGRAMMING DETAIL TO PRODUCE SPECIAL FYA-PPLT SIGNAL SEQUENCE

(program controller as shown below)

- FROM MAIN MENU PRESS '2' (PHASE CONTROL), THEN '1' (PHASE CONTROL FUNCTIONS). SCROLL TO THE BOTTOM OF THE MENU AND ENABLE ACT LOGIC COMMANDS 1, 2, AND 3.
- FROM MAIN MENU PRESS '6' (OUTPUTS), THEN '3' (LOGICAL I/O PROCESSOR).



OUTPUT REFERENCE SCHEDULE

OUTPUT 42 = Overlap C Red
OUTPUT 43 = Overlap C Yellow
OUTPUT 44 = Overlap C Green

OVERLAP PROGRAMMING DETAIL FOR DEFAULT PHASING

(program controller as shown below)

FROM MAIN MENU PRESS '8' (OVERLAPS), THEN '1' (VEHICLE OVERLAP SETTINGS).

PRESS '+' TWICE

```

PAGE 1: VEHICLE OVERLAP 'C' SETTINGS
PHASE: 12345678910111213141516
VEH OVL PARENTS: XX
VEH OVL NOT VEH:
VEH OVL NOT PED:
VEH OVL GRN EXT:
STARTUP COLOR: _ RED _ YELLOW _ GREEN
FLASH COLORS: _ RED _ YELLOW X GREEN
SELECT VEHICLE OVERLAP OPTIONS: (Y/N)
FLASH YELLOW IN CONTROLLER FLASH?...Y
GREEN EXTENSION (0-255 SEC)...0.0
YELLOW CLEAR (0=PARENT,3-25.5 SEC)...0.0
RED CLEAR (0=PARENT,0.1-25.5 SEC)...0.0
OUTPUT AS PHASE # (0=NONE, 1-16)...0
    
```

← NOTICE GREEN FLASH

OVERLAP PROGRAMMING COMPLETE

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 12-1623T1
DESIGNED: September 2016
SEALED: 11-08-2016
REVISED:

Temporary Signal - Phase 1, Step 1
(Sheet 2 of 2)

DOCUMENT NOT CONSIDERED FINAL
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343 E. Six Forks Road, Suite 200
Raleigh, North Carolina 27609
NC License No: C-1554
(919) 546-8997

ELECTRICAL AND PROGRAMMING
DETAILS FOR:

Prepared for:
Transportation Mobility and Safety Division
STATE OF NORTH CAROLINA
Signal Management Section
750 N. Greenfield Pkwy, Garner, NC 27529

US 321 (N. Chester Street)
at
Radio Street

Division 12 Gaston Co. Gastonia

PLAN DATE: September 2016 REVIEWED BY: T.R. Terrell
PREPARED BY: J.A. Wagner REVIEWED BY: N.R. Simmons

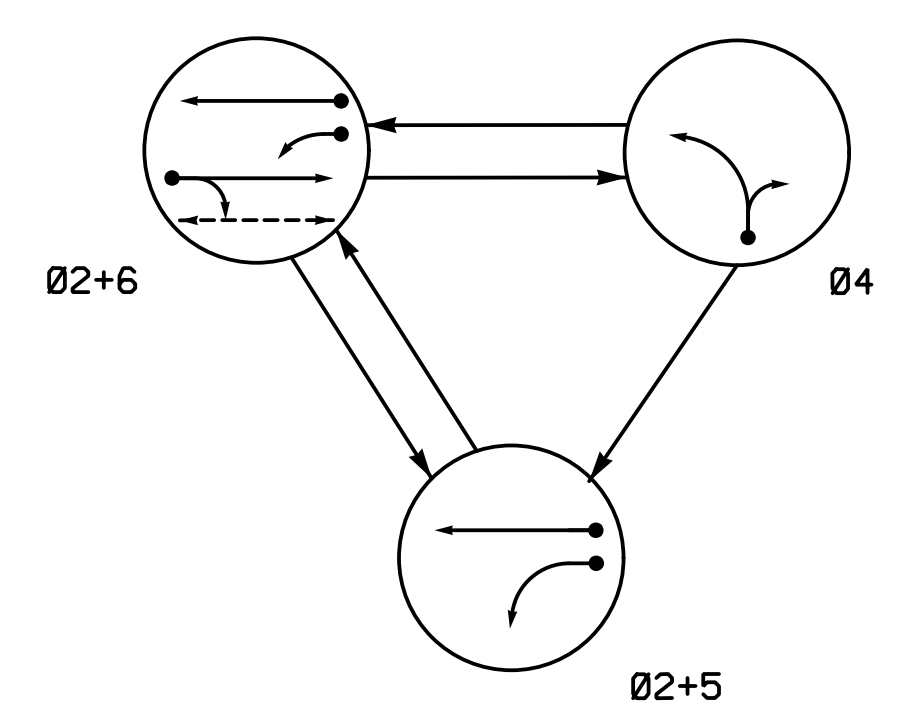
| REVISIONS | INIT. | DATE |
|-----------|-------|------|
| | | |
| | | |
| | | |

SEAL

NORTH CAROLINA
PROFESSIONAL
ENGINEER
NATASHA R. SIMMONS

11/8/2016
SIGNATURE DATE
SIG. INVENTORY NO. 12-1623T1

PHASING DIAGRAM



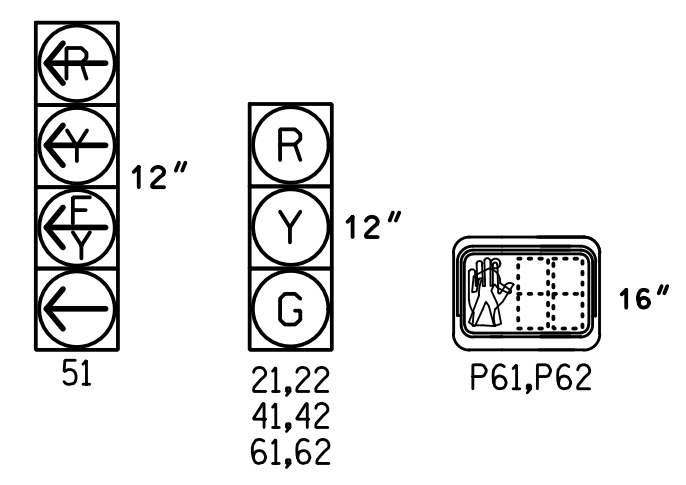
PHASING DIAGRAM DETECTION LEGEND

- ←● DETECTED MOVEMENT
- ← UNDETECTED MOVEMENT (OVERLAP)
- ←..... UNSIGNALIZED MOVEMENT
- ←- - - PEDESTRIAN MOVEMENT

| SIGNAL FACE | PHASE | | | |
|-------------|-------|-------|-----|----------|
| | Ø 2+5 | Ø 2+6 | Ø 4 | FL HEADS |
| 21,22 | G | G | R | Y |
| 41,42 | R | R | G | R |
| 51 | - | F | -R | -Y |
| 61,62 | R | G | R | Y |
| P61,P62 | DW | W | DW | DRK |

SIGNAL FACE I.D.

All Heads L.E.D.

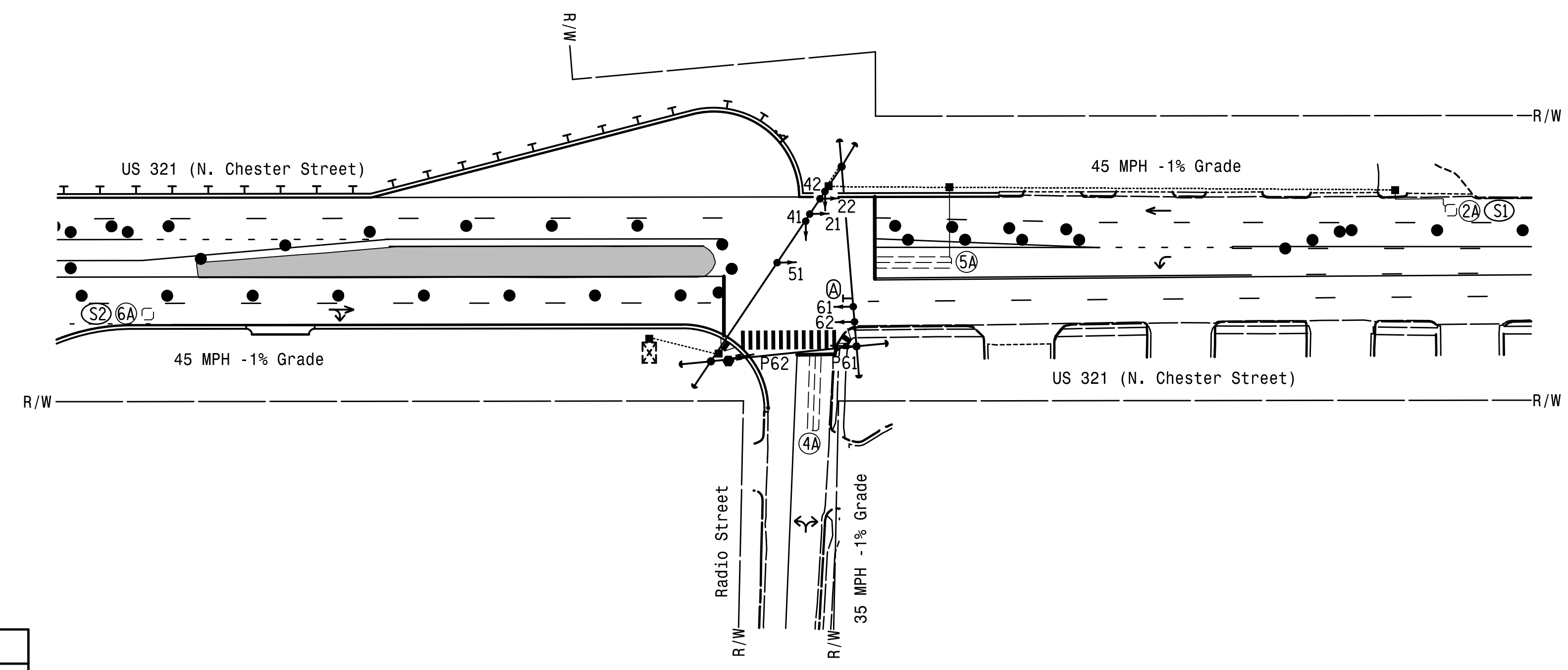


| OASIS 2070 LOOP & DETECTOR INSTALLATION CHART | | | | | | | | | | | |
|---|-----------|----------------------------|-------|----------|-------|----------------------|-----------|-----------------|--------------|------------|----------------------|
| INDUCTIVE LOOPS | | | | | | DETECTOR PROGRAMMING | | | | | |
| LOOP | SIZE (FT) | DISTANCE FROM STOPBAR (FT) | TURNS | NEW LOOP | PHASE | CALLING | EXTENSION | FULL TIME DELAY | STRETCH TIME | DELAY TIME | SYSTEM LOOP NEW CARD |
| 2A/S1 | 6X6 | 300 | 6 | - | 2 | Y | Y | - | - | - | Y |
| 4A | 6X40 | 0 | 2-4-2 | - | 4 | Y | Y | - | - | 10 | - |
| 5A | 6X40 | 0 | 2-4-2 | - | 5 | Y | Y | Y | - | 15 | - |
| 6A/S2 | 6X6 | EXIST | EXIST | - | 6 | Y | Y | - | - | - | Y |

3 Phase Fully Actuated (Gastonia City Signal System)

NOTES

- Refer to "Roadway Standard Drawings NCDOT" dated January 2012 and "Standard Specifications for Roads and Structures" dated January 2012.
- Do not program signal for late night flashing operation unless otherwise directed by the engineer.
- Phase 5 may be lagged.
- Reposition existing signal heads 21, 22, 42, 61, 62 and sign (A).
- Set all detector units to presence mode.
- Omit "WALK" and flashing "DON'T WALK" with no pedestrian calls.
- Program pedestrian heads to countdown the flashing "Don't Walk" time only.
- Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.
- Signal System data: Controller Asset #1623.



| OASIS 2070 TIMING CHART | | | | |
|-------------------------|------------|-----|-----|------------|
| FEATURE | PHASE | | | |
| | 2 | 4 | 5 | 6 |
| Min Green 1 * | 12 | 7 | 7 | 12 |
| Extension 1 * | 6.0 | 2.0 | 2.0 | 6.0 |
| Max Green 1 * | 90 | 30 | 20 | 90 |
| Yellow Clearance | 4.6 | 3.0 | 3.0 | 4.6 |
| Red Clearance | 1.3 | 2.9 | 2.1 | 1.3 |
| Red Revert | 2.0 | 2.0 | 2.0 | 2.0 |
| Walk 1 * | - | - | - | 4 |
| Don't Walk 1 | - | - | - | 12 |
| Seconds Per Actuation * | 2.5 | - | - | 2.5 |
| Max Variable Initial * | 34 | - | - | 34 |
| Time Before Reduction * | 15 | - | - | 15 |
| Time To Reduce * | 30 | - | - | 30 |
| Minimum Gap | 3.0 | - | - | 3.0 |
| Recall Mode | MIN RECALL | - | - | MIN RECALL |
| Vehicle Call Memory | YELLOW | - | - | YELLOW |
| Dual Entry | - | - | - | - |
| Simultaneous Gap | ON | ON | ON | ON |

* These values may be field adjusted. Do not adjust Min Green and Extension times for phases 2 and 6 lower than what is shown. Min Green for all other phases should not be lower than 4 seconds.

| PROPOSED | | EXISTING | |
|----------|--|----------|--|
| ○→ | Traffic Signal Head | ●→ | |
| ○→ | Modified Signal Head | N/A | |
| ↓ | Sign | ↓ | |
| ↓ | Pedestrian Signal Head With Push Button & Sign | ↓ | |
| ○→ | Signal Pole with Guy | ●→ | |
| ○→ | Signal Pole with Sidewalk Guy | ●→ | |
| ⊗ | Inductive Loop Detector | ⊗ | |
| □ | Controller & Cabinet | □ | |
| □ | Junction Box | □ | |
| - - - | 2-in Underground Conduit | - - - | |
| N/A | Right of Way | — | |
| → | Directional Arrow | → | |
| N/A | Guardrail | — | |
| - - - | Directional Drill | N/A | |
| ○ | Type II Signal Pedestal | ● | |
| N/A | Wheelchair Ramp | ↗ | |
| ⊗ | No U-Turn Sign (R3-4) | ⊗ | |
| ■ | Construction Zone | N/A | |
| ●● | Construction Zone Drums | N/A | |

Temporary Signal Phase 1, Steps 6 & 7

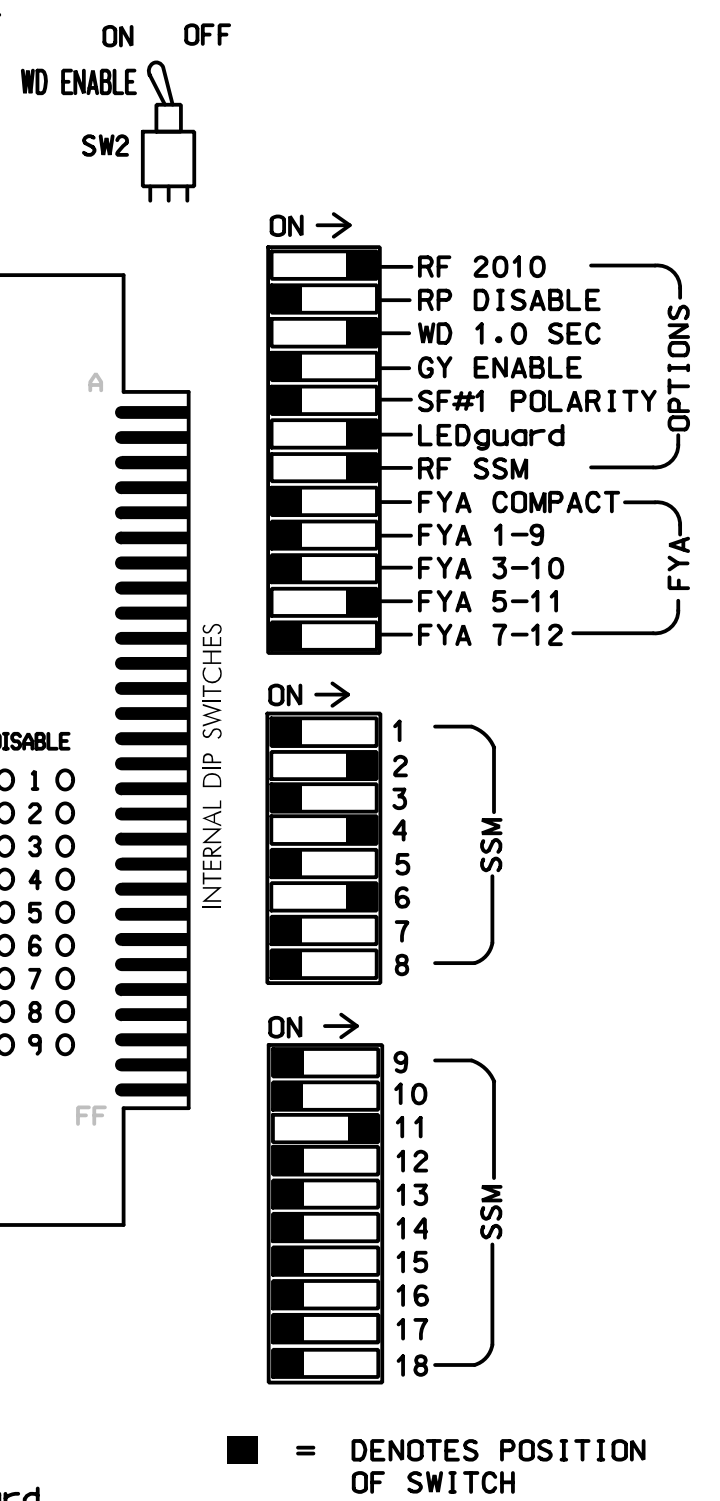
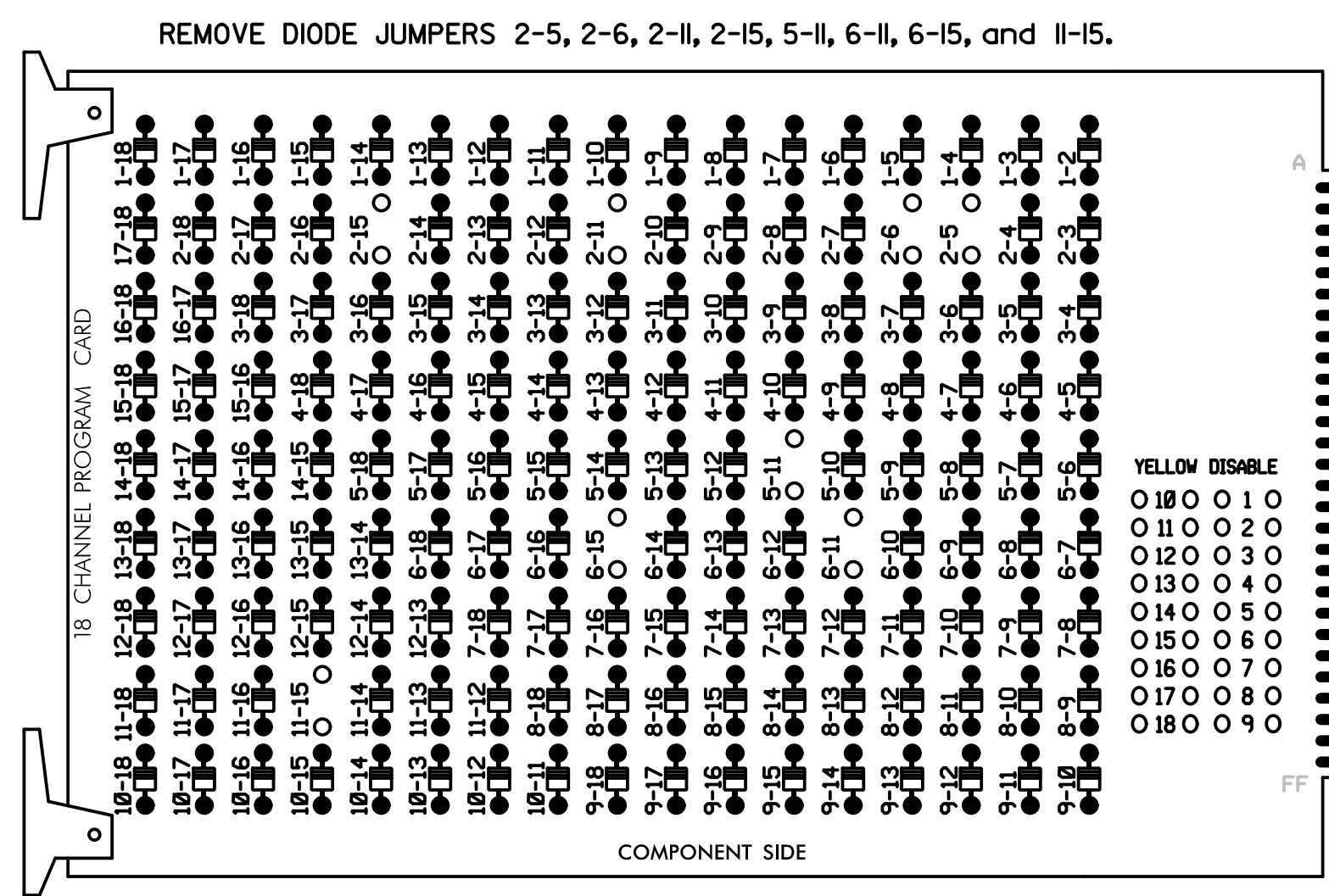
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

| | | | |
|--------------------------|--|---|------------------------------|
| | US 321 (N. Chester Street) at Radio Street | | |
| | Division 12 Gaston Co. Gastonia | PLAN DATE: September 2016 REVIEWED BY: T.R. Terrell | |
| PREPARED BY: J.A. Wagner | REVIEWED BY: N.R. Simmons | SIGNED: <i>Natasha R. Simmons</i> DATE: 11/8/2016 | |
| SCALE: 1"=50' | REVISIONS: | INIT. DATE | SIG. INVENTORY NO. 12-1623T2 |

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EDI MODEL 2018ECL-NC CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)



- NOTES:**
1. Card is provided with all diode jumpers in place. Removal of any jumper allows its channels to run concurrently.
 2. Ensure jumpers SEL2-SEL5 and SEL9 are present on the monitor board.
 3. Ensure that Red Enable is active at all times during normal operation.
 4. Connect serial cable from conflict monitor to comm. port 1 of 2070 controller. Ensure conflict monitor communicates with 2070.

NOTES

1. To prevent "flash-conflict" problems, insert red flash program blocks for all unused vehicle load switches in the output file. The installer shall verify that signal heads flash in accordance with the Signal Plans.
2. Enable Simultaneous Gap-Out for all phases.
3. Program phases 2 and 6 for Variable Initial and Gap Reduction.
4. Program phases 2 and 6 for Start Up In Green.
5. Program phase 6 for 'STARTUP PED CALL'.
6. Program phases 2 and 6 for Yellow Flash.
7. The cabinet and controller are part of the Gastonia City Signal System.

EQUIPMENT INFORMATION

CONTROLLER.....2070
 CABINET.....332 W/ AUX
 SOFTWARE.....ECONOLITE OASIS
 CABINET MOUNT.....BASE
 OUTPUT FILE POSITIONS...18 WITH AUX. OUTPUT FILE
 LOAD SWITCHES USED.....S2,S5,S7,S8,S9,AUX S4
 PHASES USED.....2,4,5,6,PED
 OVERLAP "A".....NOT USED
 OVERLAP "B".....NOT USED
 OVERLAP "C".....5+6
 OVERLAP "D".....NOT USED

SIGNAL HEAD HOOK-UP CHART

| LOAD SWITCH NO. | S1 | S2 | S3 | S4 | S5 | S6 | S7 | S8 | S9 | S10 | S11 | S12 | AUX S1 | AUX S2 | AUX S3 | AUX S4 | AUX S5 | AUX S6 | |
|-----------------------|----|-------|-----|----|-------|-----|----|-------|----------|-----|-----|-----|--------|--------|--------|--------|--------|--------|------|
| CMU CHANNEL NO. | 1 | 2 | 13 | 3 | 4 | 14 | 5 | 6 | 15 | 7 | 8 | 16 | 9 | 10 | 17 | 11 | 12 | 18 | |
| PHASE | 1 | 2 | PED | 3 | 4 | PED | 5 | 6 | PED | 7 | 8 | PED | OLA | OLB | SPARE | OLC | OLD | SPARE | |
| SIGNAL HEAD NO. | NU | 21,22 | NU | NU | 41,42 | NU | 51 | 61,62 | P61, P62 | NU | NU | NU | NU | NU | NU | 51 | NU | NU | |
| RED | | 128 | | | 101 | | | 134 | | | | | | | | | | | |
| YELLOW | | 129 | | | 102 | | * | 135 | | | | | | | | | | | |
| GREEN | | 130 | | | 103 | | | 136 | | | | | | | | | | | |
| RED ARROW | | | | | | | | | | | | | | | | | | A114 | |
| YELLOW ARROW | | | | | | | | | | | | | | | | | | | A115 |
| FLASHING YELLOW ARROW | | | | | | | | | | | | | | | | | | | A116 |
| GREEN ARROW | | | | | | | | 133 | | | | | | | | | | | |
| Hand icon | | | | | | | | | | | | | 119 | | | | | | |
| Walking person icon | | | | | | | | | | | | | 121 | | | | | | |

NU = Not Used
 * Denotes install load resistor. See load resistor installation detail this sheet.
 ★ See pictorial of head wiring in detail below.

INPUT FILE POSITION LAYOUT

(front view)

| FILE | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 |
|------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|
| U | ∅2/SYS | 2A/S1 | ∅3 | ∅4 | ∅5 | ∅6/SYS | ∅7 | ∅8 | ∅9 | ∅10 | ∅11 | ∅12 | ∅13 | ∅14 |
| L | NOT USED | NOT USED | NOT USED | NOT USED | NOT USED | NOT USED | NOT USED | NOT USED | NOT USED | NOT USED | NOT USED | NOT USED | NOT USED | NOT USED |
| U | ∅5 | ∅6/SYS | ∅7 | ∅8 | ∅9 | ∅10 | ∅11 | ∅12 | ∅13 | ∅14 | ∅15 | ∅16 | ∅17 | ∅18 |
| L | NOT USED | NOT USED | NOT USED | NOT USED | NOT USED | NOT USED | NOT USED | NOT USED | NOT USED | NOT USED | NOT USED | NOT USED | NOT USED | NOT USED |

EX.: 1A, 2A, ETC. = LOOP NO.'S
 FS = FLASH SENSE
 ST = STOP TIME
 ⊗ Wired Input - Do not populate slot with detector card

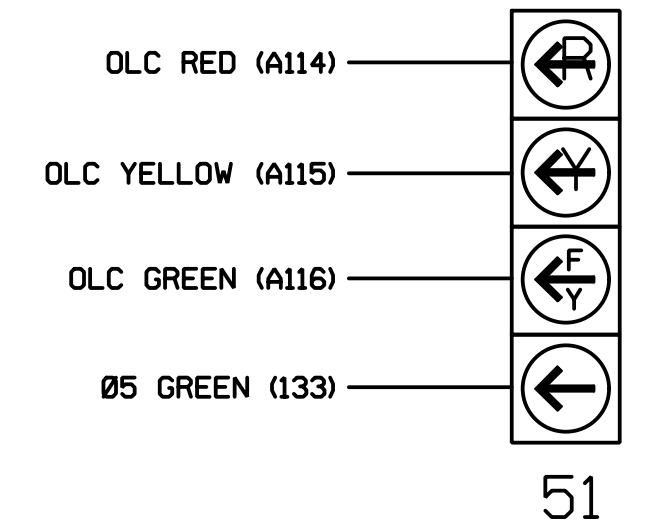
INPUT FILE CONNECTION & PROGRAMMING CHART

| LOOP NO. | LOOP TERMINAL | INPUT FILE POS. | PIN NO. | INPUT ASSIGNMENT NO. | DETECTOR NO. | NEMA PHASE | CALL | EXTEND | FULL TIME DELAY | STRETCH TIME | DELAY TIME |
|------------------|---------------|-----------------|---------|----------------------|--------------|------------|------|--------|-----------------|--------------|------------|
| 2A/S1 | TB2-5,6 | I2U | 39 | 1 | 2 | 2/SYS | Y | Y | | | |
| 4A | TB4-9,10 | I6U | 41 | 3 | 4 | 4 | Y | Y | | | 10 |
| 5A ¹ | TB3-1,2 | J1U | 55 | 17 | 5 | 5 | Y | Y | | | 15 |
| | - | I4U | 47 | 9 | 22 | 2 | Y | Y | Y | | 3 |
| 6A/S2 | TB3-5,6 | J2U | 40 | 2 | 6 | 6/SYS | Y | Y | | | |
| PED PUSH BUTTONS | | | | | | | | | | | |
| P61,P62 | TB8-7,9 | I13U | 68 | 30 | PED 6 | 6 PED | | | | | |

NOTE:
 1 Add jumper from J1-W to I4-W, on rear of input file.
 INSTALL DC ISOLATORS IN INPUT FILE SLOT 113.
 INPUT FILE POSITION LEGEND: J2L
 FILE J
 SLOT 2
 LOWER

FYA SIGNAL WIRING DETAIL

(wire signal heads as shown)



NOTE
 The sequence display for signal head 51 requires special logic programming. See sheet 2 for programming instructions.

COUNTDOWN PEDESTRIAN SIGNAL OPERATION

Countdown Ped Signals are required to display timing only during Ped Clearance Interval. Consult Ped Signal Module user's manual for instructions on selecting this feature.

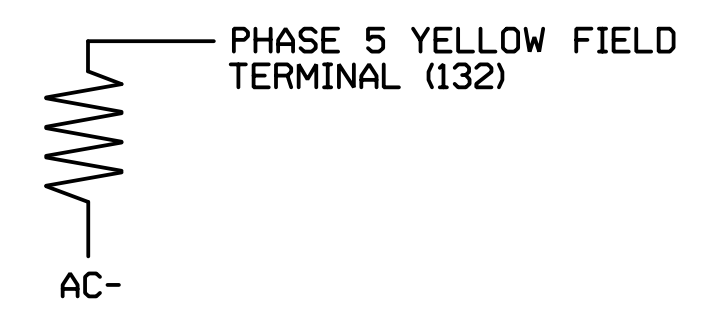
Temporary Signal -
 Phase 1, Steps 6 & 7
 (Sheet 1 of 2)

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

LOAD RESISTOR INSTALLATION DETAIL

(install resistor as shown below)

| ACCEPTABLE VALUES | VALUE (ohms) | WATTAGE |
|-------------------|--------------|-----------|
| | 1.5K - 1.9K | 25W (min) |
| | 2.0K - 3.0K | 10W (min) |



THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 12-1623T2
 DESIGNED: September 2016
 SEALED: 11-08-2016
 REVISD:

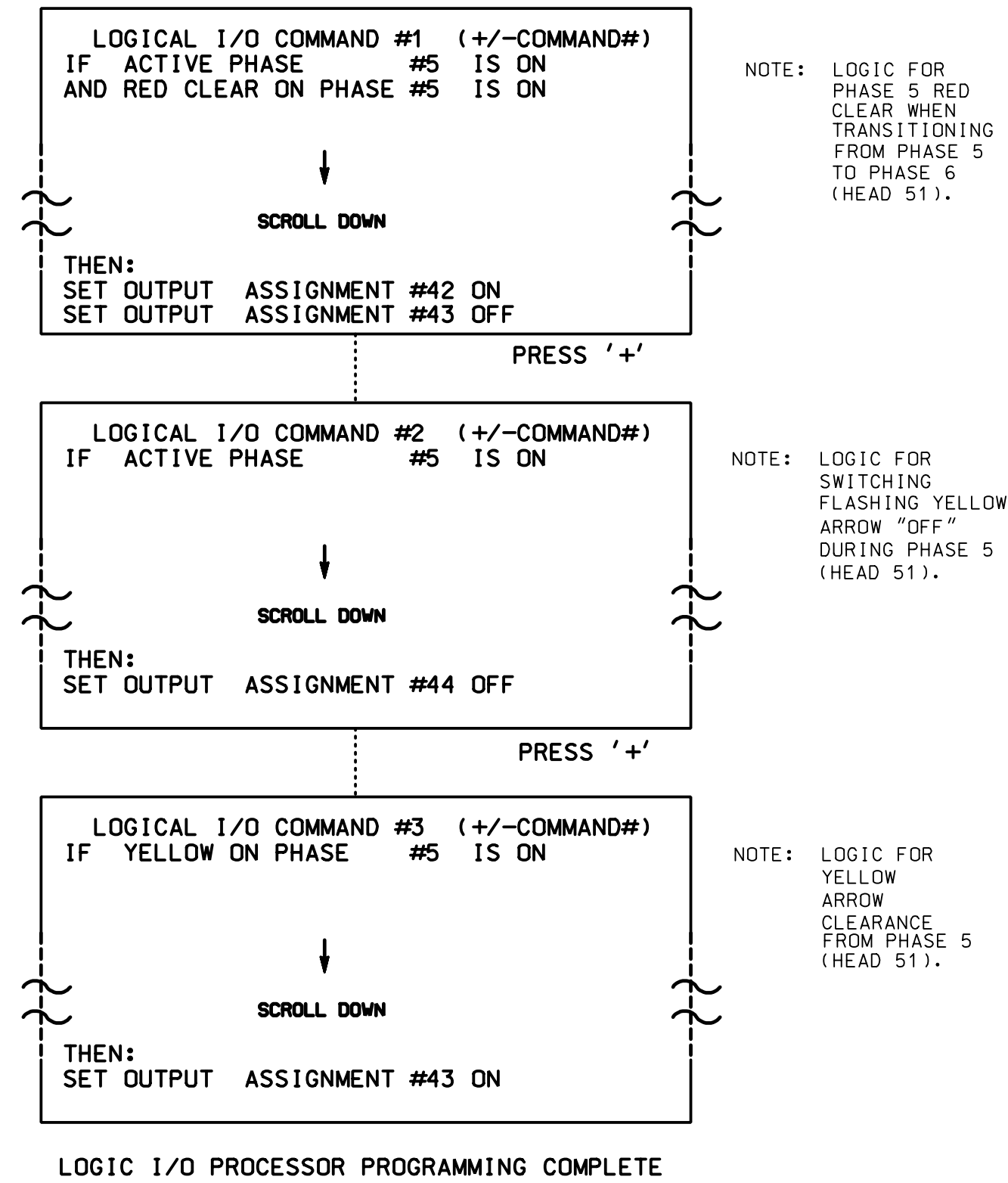
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 343 E. Six Forks Road, Suite 200
 Raleigh, North Carolina 27609
 NC License No: C-1554
 (919) 546-8997

ELECTRICAL AND PROGRAMMING DETAILS FOR:
 US 321 (N. Chester Street) at Radio Street
 Division 12 Gaston Co. Gastonia
 PLAN DATE: September 2016 REVIEWED BY: T.R. Terrell
 PREPARED BY: J.A. Wagner REVIEWED BY: N.R. Simmons
 REVISIONS INIT. DATE
 11/8/2016
 Signature: Natasha R. Simmons
 DATE
 S16. INVENTORY NO. 12-1623T2

LOGICAL I/O PROCESSOR PROGRAMMING DETAIL TO PRODUCE SPECIAL FYA-PPLT SIGNAL SEQUENCE

(program controller as shown below)

- FROM MAIN MENU PRESS '2' (PHASE CONTROL), THEN '1' (PHASE CONTROL FUNCTIONS). SCROLL TO THE BOTTOM OF THE MENU AND ENABLE ACT LOGIC COMMANDS 1, 2, AND 3.
- FROM MAIN MENU PRESS '6' (OUTPUTS), THEN '3' (LOGICAL I/O PROCESSOR).



OUTPUT REFERENCE SCHEDULE

OUTPUT 42 = Overlap C Red
OUTPUT 43 = Overlap C Yellow
OUTPUT 44 = Overlap C Green

OVERLAP PROGRAMMING DETAIL FOR DEFAULT PHASING

(program controller as shown below)

FROM MAIN MENU PRESS '8' (OVERLAPS), THEN '1' (VEHICLE OVERLAP SETTINGS).

PRESS '+' TWICE

```

PAGE 1: VEHICLE OVERLAP 'C' SETTINGS
PHASE: |12345678910111213141516
VEH OVL PARENTS: |XX
VEH OVL NOT VEH: |
VEH OVL NOT PED: |
VEH OVL GRN EXT: |
STARTUP COLOR: _ RED _ YELLOW _ GREEN
FLASH COLORS: _ RED _ YELLOW X GREEN
SELECT VEHICLE OVERLAP OPTIONS: (Y/N)
FLASH YELLOW IN CONTROLLER FLASH?...Y
GREEN EXTENSION (0-255 SEC)...0.0
YELLOW CLEAR (0=PARENT,3-25.5 SEC)...0.0
RED CLEAR (0=PARENT,0.1-25.5 SEC)...0.0
OUTPUT AS PHASE # (0=NONE, 1-16)...0
    
```

← NOTICE GREEN FLASH

OVERLAP PROGRAMMING COMPLETE

THIS ELECTRICAL DETAIL IS FOR
THE SIGNAL DESIGN: 12-1623T2
DESIGNED: September 2016
SEALED: 11-08-2016
REVISED:

Temporary Signal -
Phase 1, Steps 6 & 7
(Sheet 2 of 2)

DOCUMENT NOT CONSIDERED FINAL
UNLESS ALL SIGNATURES COMPLETED

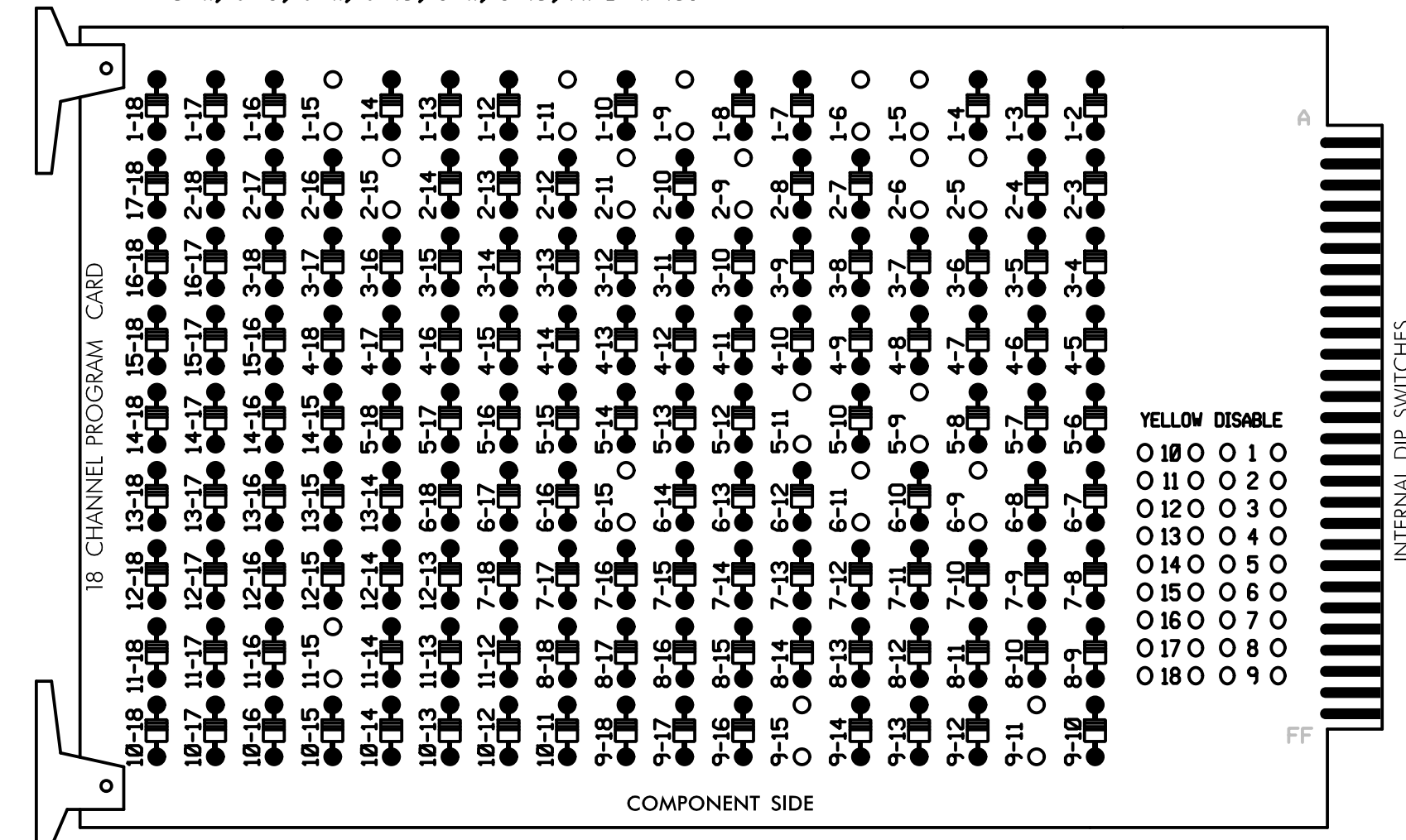
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| | | | |
|---------------------------|---|----------|---|
| | Prepared for: US 321 (N. Chester Street) at Radio Street | | SEAL |
| | Division 12 Gaston Co. | Gastonia | |
| PLAN DATE: September 2016 | REVIEWED BY: T.R. Terrell | | 11/8/2016 Signature: <i>Natasha R. Simmons</i> DATE: _____ DATE: _____ |
| PREPARED BY: J.A. Wagner | REVIEWED BY: N.R. Simmons | | |
| REVISIONS | INIT. | DATE | SIG. INVENTORY NO. 12-1623T2 |

EDI MODEL 2018ECL-NC CONFLICT MONITOR PROGRAMMING DETAIL

(remove jumpers and set switches as shown)

REMOVE DIODE JUMPERS 1-5, 1-6, 1-9, 1-11, 1-15, 2-5, 2-6, 2-9, 2-11, 2-15, 5-9, 5-11, 6-9, 6-11, 6-15, 9-11, 9-15, AND 11-15.



REMOVE JUMPERS AS SHOWN

NOTES:

- Card is provided with all diode jumpers in place. Removal of any jumper allows its channels to run concurrently.
- Ensure jumpers SEL2-SEL5 and SEL9 are present on the monitor board.
- Ensure that Red Enable is active at all times during normal operation.
- Connect serial cable from conflict monitor to comm. port 1 of 2070 controller. Ensure conflict monitor communicates with 2070.

NOTES

- To prevent "flash-conflict" problems, insert red flash program blocks for all unused vehicle load switches in the output file. The installer shall verify that signal heads flash in accordance with the Signal Plans.
- Enable Simultaneous Gap-Out for all phases.
- Program phases 2 and 6 for Variable Initial and Gap Reduction.
- Program phases 2 and 6 for Start Up In Green.
- Program phase 6 for 'STARTUP PED CALL'.
- Program phases 2 and 6 for Yellow Flash, and overlap 1 as Wag Overlaps.
- The cabinet and controller are part of the Gastonia City Signal System.

EQUIPMENT INFORMATION

CONTROLLER.....2070
 CABINET.....332 W/ AUX
 SOFTWARE.....ECONOLITE OASIS
 CABINET MOUNT.....BASE
 OUTPUT FILE POSITIONS...18 WITH AUX. OUTPUT FILE
 LOAD SWITCHES USED.....S1,S2,S5,S7,S8,S9,AUX S1,AUX S4
 PHASES USED.....1,2,4,5,6,6PED
 OVERLAP "A".....1+2*
 OVERLAP "B".....NOT USED
 OVERLAP "C".....5+6*
 OVERLAP "D".....NOT USED
 *ALTERNATE PHASING OVERLAP PROGRAMMING DETAIL SHOWN ON SHEET 2

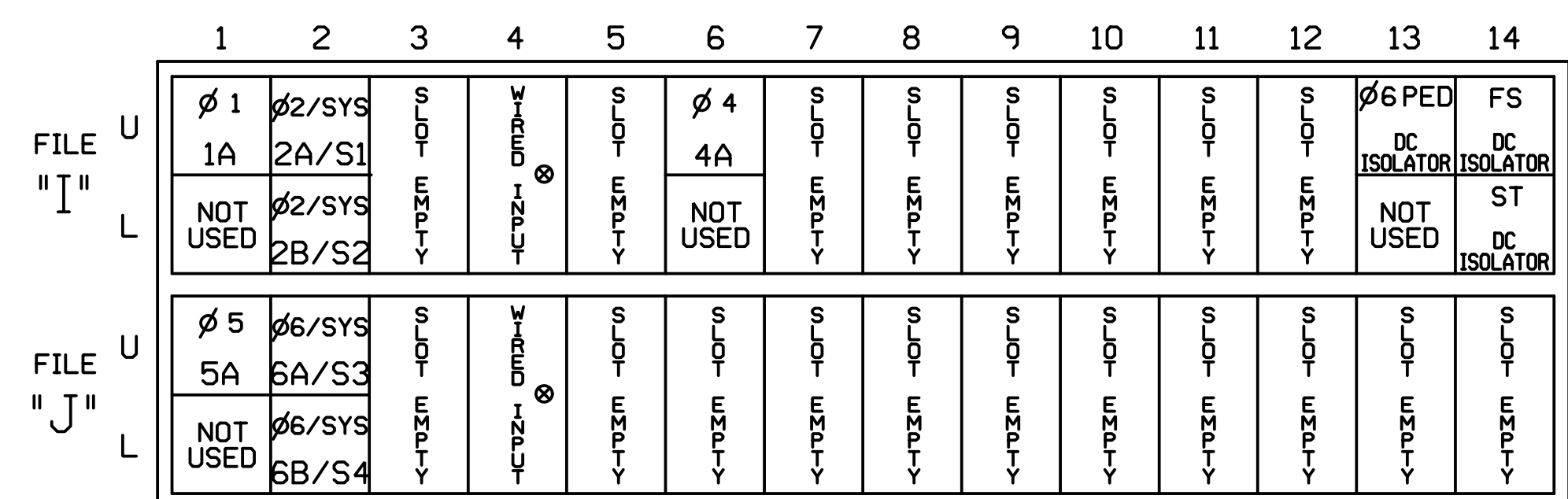
SIGNAL HEAD HOOK-UP CHART

| LOAD SWITCH NO. | S1 | S2 | S3 | S4 | S5 | S6 | S7 | S8 | S9 | S10 | S11 | S12 | AUX S1 | AUX S2 | AUX S3 | AUX S4 | AUX S5 | AUX S6 |
|-----------------|-----|-------|-------|----|-------|-------|-----|-------|----------|-----|-----|-------|--------|--------|--------|--------|--------|--------|
| CMU CHANNEL NO. | 1 | 2 | 13 | 3 | 4 | 14 | 5 | 6 | 15 | 7 | 8 | 16 | 9 | 10 | 17 | 11 | 12 | 18 |
| PHASE | 1 | 2 | 2 PED | 3 | 4 | 4 PED | 5 | 6 | 6 PED | 7 | 8 | 8 PED | OLA | OLB | SPARE | OLC | OLD | SPARE |
| SIGNAL HEAD NO. | 11 | 21,22 | NU | NU | 41,42 | NU | 51 | 61,62 | P61, P62 | NU | NU | NU | 11 | NU | NU | 51 | NU | NU |
| RED | | 128 | | | 101 | | | 134 | | | | | | | | | | |
| YELLOW | * | 129 | | | 102 | | * | 135 | | | | | | | | | | |
| GREEN | | 130 | | | 103 | | | 136 | | | | | | | | | | |
| RED ARROW | | | | | | | | | | | | | A121 | | | A114 | | |
| YELLOW ARROW | | | | | | | | | | | | | A122 | | | A115 | | |
| GREEN ARROW | 127 | | | | | | 133 | | | | | | A123 | | | A116 | | |
| Hand | | | | | | | | | 119 | | | | | | | | | |
| Walking | | | | | | | | | 121 | | | | | | | | | |

NU = Not Used
 * Denotes install load resistor. See load resistor installation detail this sheet.
 ★ See pictorial of head wiring in detail below.

INPUT FILE POSITION LAYOUT

(front view)



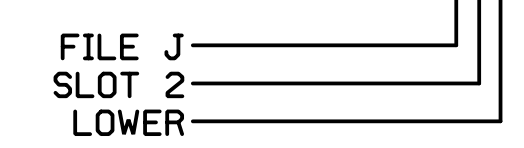
EX.: 1A, 2A, ETC. = LOOP NO.'S
 FS = FLASH SENSE
 ST = STOP TIME
 ⊗ Wired Input - Do not populate slot with detector card

INPUT FILE CONNECTION & PROGRAMMING CHART

| LOOP NO. | LOOP TERMINAL | INPUT FILE POS. | PIN NO. | INPUT ASSIGNMENT NO. | DETECTOR NO. | NEMA PHASE | CALL | EXTEND | FULL TIME DELAY | STRETCH TIME | DELAY TIME |
|------------------|---------------|-----------------|---------|----------------------|--------------|------------|------|--------|-----------------|--------------|------------|
| 1A ¹ | TB2-1,2 | I1U | 56 | 18 | 1 | 1 | Y | Y | | | 15 |
| | - | J4U | 48 | 10★ | 26 | 6 | Y | Y | Y | | 3 |
| | - | I1U | 56 | 18★ | 51 | 1 | Y | Y | | | 3 |
| 2A/S1 | TB2-5,6 | I2U | 39 | 1 | 2 | 2/SYS | Y | Y | | | |
| 2B/S2 | TB2-7,8 | I2L | 43 | 5 | 12 | 2/SYS | Y | Y | | | |
| 4A | TB4-9,10 | I6U | 41 | 3 | 4 | 4 | Y | Y | | | 10 |
| | TB3-1,2 | J1U | 55 | 17 | 5 | 5 | Y | Y | | | 15 |
| | - | I4U | 47 | 9★ | 22 | 2 | Y | Y | Y | | 3 |
| 6A/S3 | TB3-5,6 | J2U | 40 | 2 | 6 | 6/SYS | Y | Y | | | |
| 6B/S4 | TB3-7,8 | J2L | 44 | 6 | 16 | 6/SYS | Y | Y | | | |
| PED PUSH BUTTONS | | | | | | | | | | | |
| P61,P62 | TB8-7,9 | I13U | 68 | 30 | | PED 6 | | | | | |

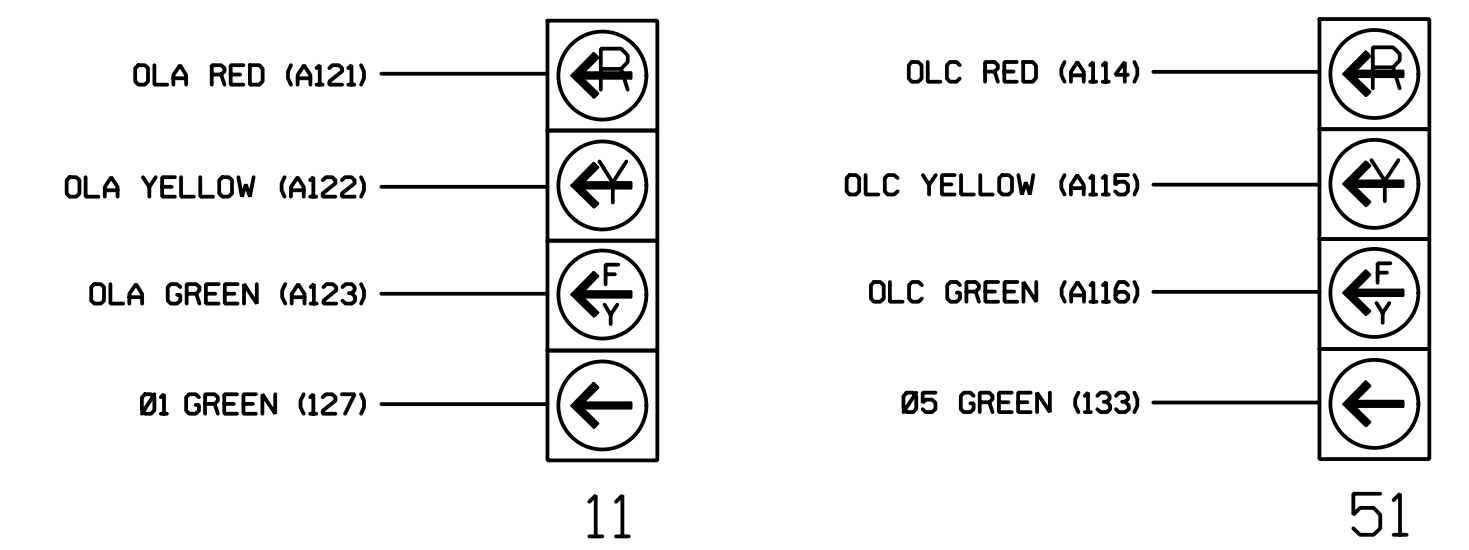
- NOTE:
 1 Add jumper from I1-W to J4-W, on rear of input file.
 2 Add jumper from J1-W to I4-W, on rear of input file.
 * See Input Page Assignment programming details on sheets 3 and 4.

INPUT FILE POSITION LEGEND: J2L



FYA SIGNAL WIRING DETAIL

(wire signal heads as shown)

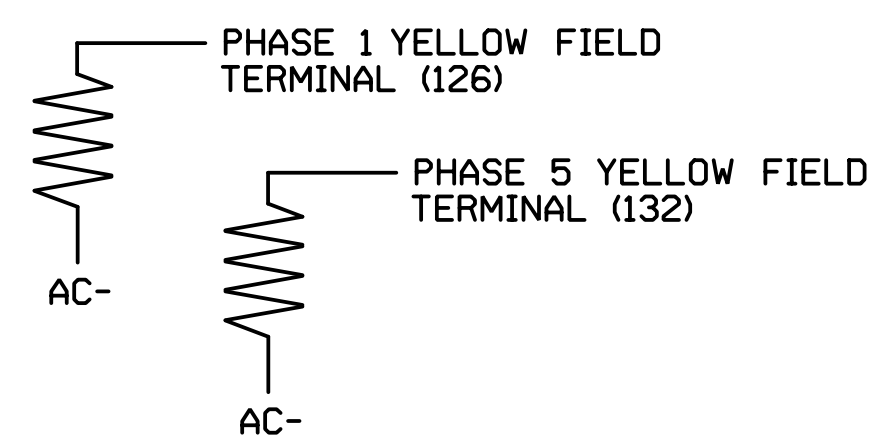


NOTE
 The sequence display for signal heads 11 and 51 requires special logic programming. See sheet 2 for programming instructions.

LOAD RESISTOR INSTALLATION DETAIL

(install resistors as shown below)

| ACCEPTABLE VALUES | |
|-------------------|-----------|
| VALUE (ohms) | WATTAGE |
| 1.5K - 1.9K | 25W (min) |
| 2.0K - 3.0K | 10W (min) |



THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 12-1623
 DESIGNED: September 2016
 SEALED: 12-16-2016
 REVISED:



HNTB NORTH CAROLINA, P.C.
 343 E. Six Forks Road, Suite 200
 Raleigh, North Carolina 27609
 NC License No: C-1554
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COUNTDOWN PEDESTRIAN SIGNAL OPERATION

Countdown Ped Signals are required to display timing only during Ped Clearance Interval. Consult Ped Signal Module user's manual for instructions on selecting this feature.

Signal Upgrade - Final Design
 (Sheet 1 of 5)

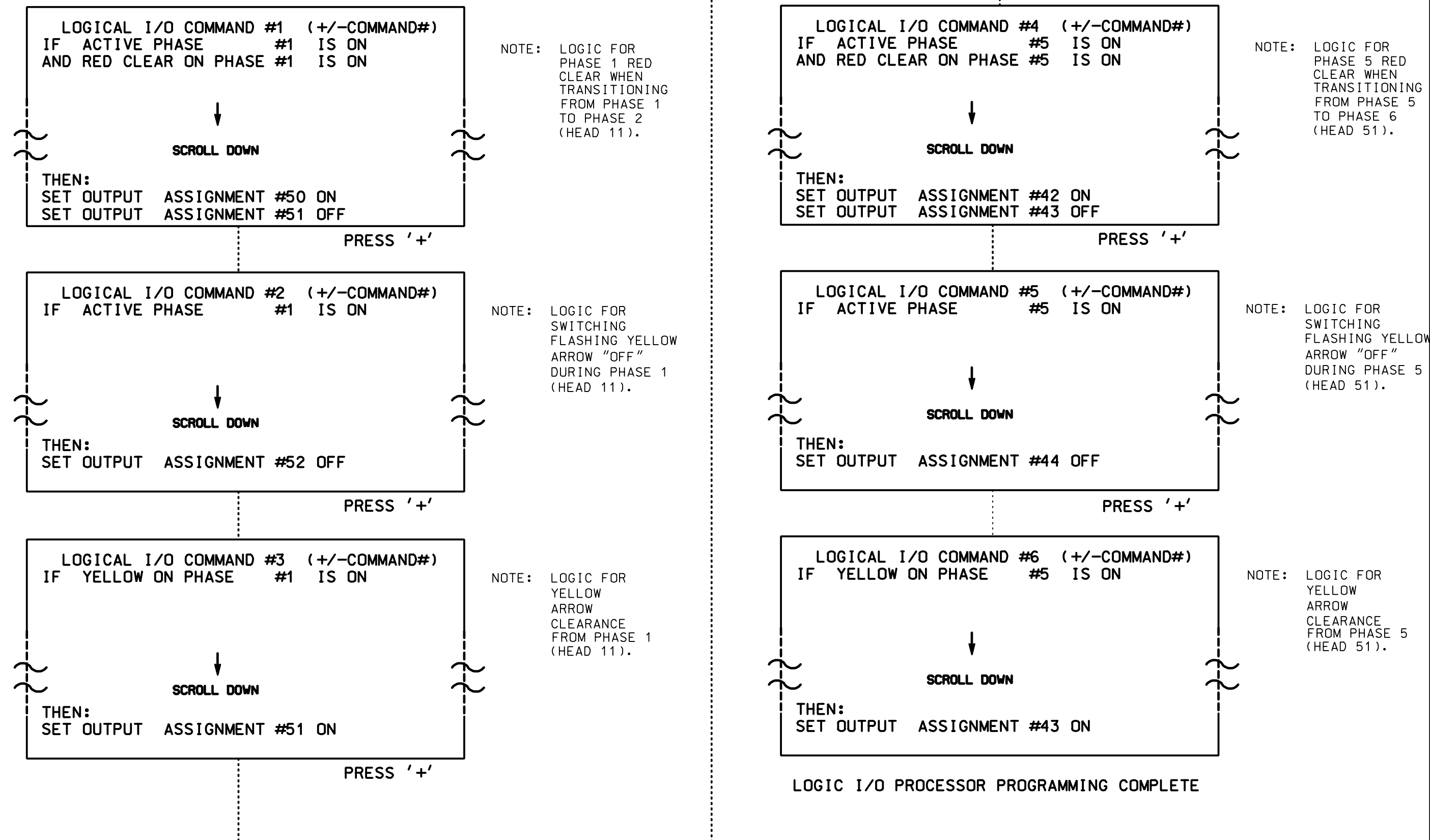
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

| | | | |
|---|--|--|----------|
| ELECTRICAL AND PROGRAMMING DETAILS FOR: | US 321 (N. Chester Street) at Radio Street | | SEAL |
| | Division 12 PLAN DATE: September 2016 PREPARED BY: J.A. Wagner | Gaston Co. REVIEWED BY: T.R. Terrell REVIEWED BY: N.R. Simmons | |

LOGICAL I/O PROCESSOR PROGRAMMING DETAIL TO PRODUCE SPECIAL FYA-PPLT SIGNAL SEQUENCE

(program controller as shown below)

1. FROM MAIN MENU PRESS '2' (PHASE CONTROL), THEN '1' (PHASE CONTROL FUNCTIONS). SCROLL TO THE BOTTOM OF THE MENU AND ENABLE ACT LOGIC COMMANDS 1, 2, 3, 4, 5 AND 6.
2. FROM MAIN MENU PRESS '6' (OUTPUTS), THEN '3' (LOGICAL I/O PROCESSOR).

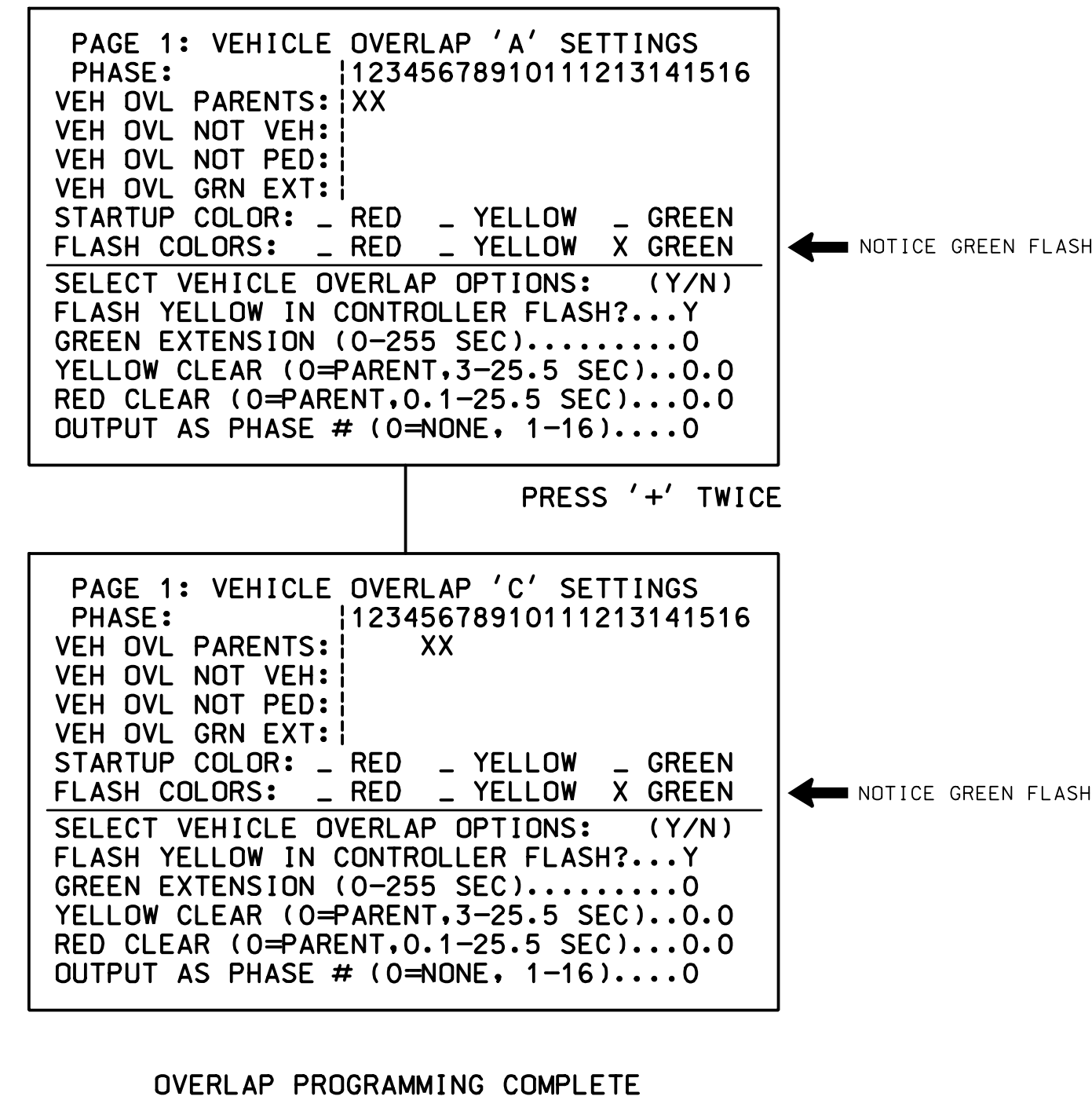


| OUTPUT REFERENCE SCHEDULE | |
|---------------------------|------------------|
| OUTPUT 42 = | Overlap C Red |
| OUTPUT 43 = | Overlap C Yellow |
| OUTPUT 44 = | Overlap C Green |
| OUTPUT 50 = | Overlap A Red |
| OUTPUT 51 = | Overlap A Yellow |
| OUTPUT 52 = | Overlap A Green |

OVERLAP PROGRAMMING DETAIL FOR DEFAULT PHASING

(program controller as shown below)

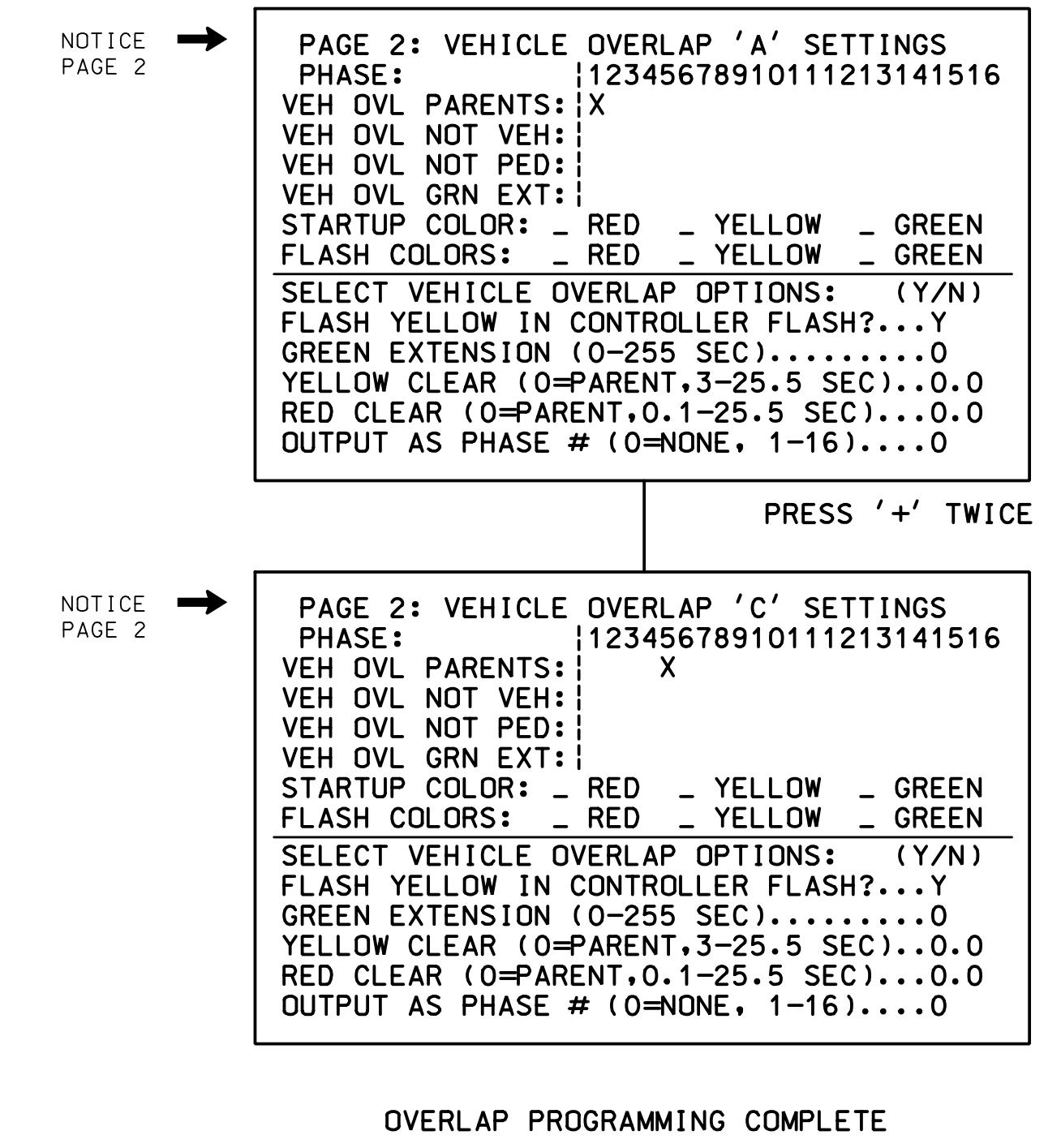
FROM MAIN MENU PRESS '8' (OVERLAPS), THEN '1' (VEHICLE OVERLAP SETTINGS).



OVERLAP PROGRAMMING DETAIL FOR ALTERNATE PHASING

(program controller as shown below)

FROM MAIN MENU PRESS '8' (OVERLAPS), THEN '1' (VEHICLE OVERLAP SETTINGS). PRESS 'NEXT' TO ADVANCE TO PAGE 2.



THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 12-1623
 DESIGNED: September 2016
 SEALED: 12-16-2016
 REVISED:

Signal Upgrade - Final Design
(Sheet 2 of 5)

**DOCUMENT NOT CONSIDERED FINAL
UNLESS ALL SIGNATURES COMPLETED**

| | | |
|---|---|---|
| HNTB NORTH CAROLINA, P.C. 343 E. Six Forks Road, Suite 200 Raleigh, North Carolina 27609 NC License No: C-1554 (919) 546-8997 | US 321 (N. Chester Steet) at Radio Street Division 12 Gaston Co. Gastonia PLAN DATE: September 2016 REVIEWED BY: T.R. Terrell PREPARED BY: J.A. Wagner REVIEWED BY: N.R. Simmons | SEAL SEAL 031464 ENGINEER NATASHA R. SIMMONS 12/16/2016 SIGNATURE DATE SIG. INVENTORY NO. 12-1623 |
|---|---|---|

INPUT PAGE 2 ASSIGNMENT PROGRAMMING DETAIL FOR ALTERNATE PHASING - LOOP 1A

(program controller as shown below)

- NOTES: 1. THIS PROGRAMMING APPLIES FOR INPUT PAGE 2 ONLY. INPUT PAGE 1 WILL USE STANDARD DEFAULT SETTINGS. THIS PROGRAMMING IS NECESSARY FOR PROPER DETECTOR OPERATION DURING ALTERNATE PHASING OPERATION.
2. THE FIRST TASK THIS PROGRAMMING ACCOMPLISHES IS THE DISABLING OF INPUT #10 (DETECTOR 26) SO THAT A VEHICLE CALL WILL NOT BE PLACED TO PHASE 6 DURING ALTERNATE PHASING OPERATION. THE SECOND TASK THIS PROGRAMMING ACCOMPLISHES IS THAT IT REASSIGNS DETECTOR 51 TO INPUT #18 SO THAT THE DELAY ON LOOP 1A CAN BE REDUCED FROM 15 SECONDS TO 3 SECONDS.

FROM MAIN MENU PRESS '5' (INPUTS), THEN PRESS 'NEXT' TO GET TO INPUT PAGE '2'. PRESS THE '+' KEY UNTIL INPUT 10 IS REACHED.

```

PAGE: 2 C1 PIN:48 VEHICLE DETECTOR
INPUT ASSIGNMENT #.....10
DEBOUNCE TIME (0-25.5 SEC).....0.5
DELAY TIME (0-25.5 SEC).....0.0
HOLD-OVER TIME (0-25.5 SEC).....0.0
ASSIGNMENT SELECTION:
NOT ENABLED (Y/N).....Y
VEHICLE DETECTOR (1-64).....26
PEDESTRIAN DETECTOR (1-16).....
ALTERNATE PED DETECTOR (1-16).....
PREEMPT (1-10).....
INVERTED PREEMPT (1-10).....
STOP TIME (Y/N).....
FLASH SENSE (Y/N).....
DOOR OPEN (Y/N).....
MANUAL CONTROL ENABLE (Y/N).....
MANUAL CONTROL ADVANCE (Y/N).....
SPECIAL FUNCTION ALARM (1-8).....
TOD HOUR SYNCHRONIZATION (0-23).....
FORCE OFF RING (1-4).....
HOLD PHASES (1-16).....
PLAN (65=FLSH,66=FREE)..... OFFSET#...
CHANGE PHASE SEQUENCE PAGE (1-12)....
CHANGE PHASE TIMING PAGE (1-4).....
CHANGE PHASE CONTROL PAGE (1-4).....
CHANGE OVERLAP CONTROL PAGE (1-4)....
CHANGE INPUT PAGE (1-4).....
CHANGE OUTPUT PAGE (1-4).....
OVERRIDE PHASE CONTROL FUNCTION (Y)....
    
```

ENTER A 'Y' FOR NOT ENABLED →
 DEFAULT DETECTOR NUMBER WILL REMAIN UNTIL 'NOT ENABLED' IS ENTERED.

(LOOP 1A - PHASE 6)

```

PAGE: 2 C1 PIN:48 NOT ENABLED
INPUT ASSIGNMENT #.....10
DEBOUNCE TIME (0-25.5 SEC).....0.5
DELAY TIME (0-25.5 SEC).....0.0
HOLD-OVER TIME (0-25.5 SEC).....0.0
ASSIGNMENT SELECTION:
NOT ENABLED (Y/N).....Y
VEHICLE DETECTOR (1-64).....
PEDESTRIAN DETECTOR (1-16).....
ALTERNATE PED DETECTOR (1-16).....
PREEMPT (1-10).....
INVERTED PREEMPT (1-10).....
STOP TIME (Y/N).....
FLASH SENSE (Y/N).....
DOOR OPEN (Y/N).....
MANUAL CONTROL ENABLE (Y/N).....
MANUAL CONTROL ADVANCE (Y/N).....
SPECIAL FUNCTION ALARM (1-8).....
TOD HOUR SYNCHRONIZATION (0-23).....
FORCE OFF RING (1-4).....
HOLD PHASES (1-16).....
PLAN (65=FLSH,66=FREE)..... OFFSET#...
CHANGE PHASE SEQUENCE PAGE (1-12)....
CHANGE PHASE TIMING PAGE (1-4).....
CHANGE PHASE CONTROL PAGE (1-4).....
CHANGE OVERLAP CONTROL PAGE (1-4)....
CHANGE INPUT PAGE (1-4).....
CHANGE OUTPUT PAGE (1-4).....
OVERRIDE PHASE CONTROL FUNCTION (Y)....
    
```

PRESS '+' TO ADVANCE TO INPUT 18

```

PAGE: 2 C1 PIN:56 VEHICLE DETECTOR
INPUT ASSIGNMENT #.....18
DEBOUNCE TIME (0-25.5 SEC).....0.5
DELAY TIME (0-25.5 SEC).....0.0
HOLD-OVER TIME (0-25.5 SEC).....0.0
ASSIGNMENT SELECTION:
NOT ENABLED (Y/N).....
VEHICLE DETECTOR (1-64).....1
PEDESTRIAN DETECTOR (1-16).....
ALTERNATE PED DETECTOR (1-16).....
PREEMPT (1-10).....
INVERTED PREEMPT (1-10).....
STOP TIME (Y/N).....
FLASH SENSE (Y/N).....
DOOR OPEN (Y/N).....
MANUAL CONTROL ENABLE (Y/N).....
MANUAL CONTROL ADVANCE (Y/N).....
SPECIAL FUNCTION ALARM (1-8).....
TOD HOUR SYNCHRONIZATION (0-23).....
FORCE OFF RING (1-4).....
HOLD PHASES (1-16).....
PLAN (65=FLSH,66=FREE)..... OFFSET#...
CHANGE PHASE SEQUENCE PAGE (1-12)....
CHANGE PHASE TIMING PAGE (1-4).....
CHANGE PHASE CONTROL PAGE (1-4).....
CHANGE OVERLAP CONTROL PAGE (1-4)....
CHANGE INPUT PAGE (1-4).....
CHANGE OUTPUT PAGE (1-4).....
OVERRIDE PHASE CONTROL FUNCTION (Y)....
    
```

ENTER '51' TO REASSIGN THE VEHICLE DETECTOR FOR THIS INPUT

(LOOP 1A - PHASE 1)

```

PAGE: 2 C1 PIN:56 VEHICLE DETECTOR
INPUT ASSIGNMENT #.....18
DEBOUNCE TIME (0-25.5 SEC).....0.5
DELAY TIME (0-25.5 SEC).....0.0
HOLD-OVER TIME (0-25.5 SEC).....0.0
ASSIGNMENT SELECTION:
NOT ENABLED (Y/N).....
VEHICLE DETECTOR (1-64).....51
PEDESTRIAN DETECTOR (1-16).....
ALTERNATE PED DETECTOR (1-16).....
PREEMPT (1-10).....
INVERTED PREEMPT (1-10).....
STOP TIME (Y/N).....
FLASH SENSE (Y/N).....
DOOR OPEN (Y/N).....
MANUAL CONTROL ENABLE (Y/N).....
MANUAL CONTROL ADVANCE (Y/N).....
SPECIAL FUNCTION ALARM (1-8).....
TOD HOUR SYNCHRONIZATION (0-23).....
FORCE OFF RING (1-4).....
HOLD PHASES (1-16).....
PLAN (65=FLSH,66=FREE)..... OFFSET#...
CHANGE PHASE SEQUENCE PAGE (1-12)....
CHANGE PHASE TIMING PAGE (1-4).....
CHANGE PHASE CONTROL PAGE (1-4).....
CHANGE OVERLAP CONTROL PAGE (1-4)....
CHANGE INPUT PAGE (1-4).....
CHANGE OUTPUT PAGE (1-4).....
OVERRIDE PHASE CONTROL FUNCTION (Y)....
    
```

PROGRAMMING COMPLETE

SPECIAL DETECTOR PROGRAMMING DETAIL - LOOP 1A (ALT.)

(program controller as shown below)

FROM MAIN MENU PRESS '7' (DETECTORS), THEN PRESS '1' FOR VEHICLE DETECTORS. PRESS THE '-' KEY TO GET TO VEHICLE DETECTOR #51.

```

VEHICLE DETECTOR #51 SETTINGS (+,-,1-64)
SETTING: (Y/N)
ENABLE DETECTOR.....N
ENABLE LOGGING.....N
ENABLE DIAGNOSTICS.....N
SPEED TRAP.....N
CALL DETECTOR.....Y
EXTENSION DETECTOR.....Y
MODE 2 STOP BAR.....N
SWITCHING DETECTOR.....N
DUPLICATING DETECTOR.....N
ENABLE FULL TIME DELAY.....N
IF FAILED, SET MIN RECALL?.....N
IF FAILED, SET MAX1 RECALL?.....N
IF FAILED, SET MAX2 RECALL?.....N
PHASE# 12345678910111213141516
PHASES ASSIGNED |
SWITCH/DUPLICATE|
LOOP SIZE (0-255 FT).....6
SPEED TRAP DISTANCE (0-255 FT).....0
STOP BAR TIME (0-255 SEC).....0
STRETCH (0-25.5 SEC).....0.0
DELAY (0-255 SEC).....0
MAX CALLS/MIN (0-255).....255
MIN CALLS/DIAGNOSTIC PERIOD (0-255).....0
MAX OCCUPANCY (0-100%).....100
EXTENSION DISABLE TIME (0-255 SEC).....0
QUEUE MAX OCCUPANCY TIME (0-255).....0
QUEUE GAP RESET TIME (0-25.5).....0.0
PREEMPTION INDEX FOR QUEUE (0-10).....0
    
```

ENTER 'Y' FOR ENABLE DETECTOR →

ENTER '1' FOR PHASES ASSIGNED →

ENSURE DELAY IS '3' →

```

VEHICLE DETECTOR #51 SETTINGS (+,-,1-64)
SETTING: (Y/N)
ENABLE DETECTOR.....Y
ENABLE LOGGING.....N
ENABLE DIAGNOSTICS.....N
SPEED TRAP.....N
CALL DETECTOR.....Y
EXTENSION DETECTOR.....Y
MODE 2 STOP BAR.....N
SWITCHING DETECTOR.....N
DUPLICATING DETECTOR.....N
ENABLE FULL TIME DELAY.....N
IF FAILED, SET MIN RECALL?.....N
IF FAILED, SET MAX1 RECALL?.....N
IF FAILED, SET MAX2 RECALL?.....N
PHASE# 12345678910111213141516
PHASES ASSIGNED |X
SWITCH/DUPLICATE|
LOOP SIZE (0-255 FT).....6
SPEED TRAP DISTANCE (0-255 FT).....0
STOP BAR TIME (0-255 SEC).....0
STRETCH (0-25.5 SEC).....0.0
DELAY (0-255 SEC).....3
MAX CALLS/MIN (0-255).....255
MIN CALLS/DIAGNOSTIC PERIOD (0-255).....0
MAX OCCUPANCY (0-100%).....100
EXTENSION DISABLE TIME (0-255 SEC).....0
QUEUE MAX OCCUPANCY TIME (0-255).....0
QUEUE GAP RESET TIME (0-25.5).....0.0
PREEMPTION INDEX FOR QUEUE (0-10).....0
    
```

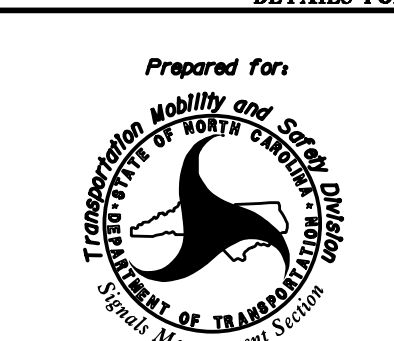
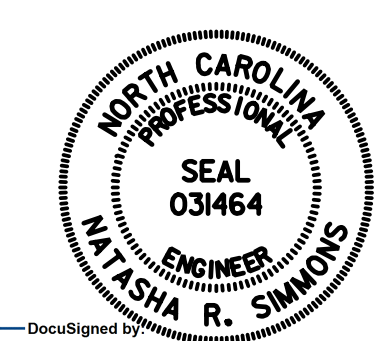
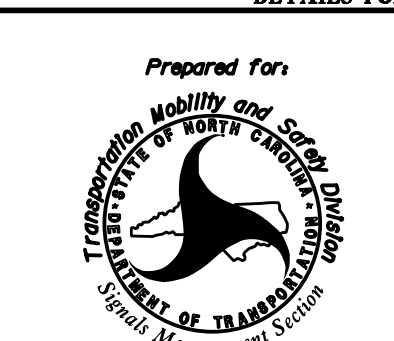
DETECTOR PROGRAMMING COMPLETE

NOTE: DETECTOR IS PROGRAMMED PER THE INPUT FILE CONNECTION AND PROGRAMMING CHART SHOWN ON SHEET 1.

THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 12-1623
 DESIGNED: September 2016
 SEALED: 12-16-2016
 REVISED:

Signal Upgrade - Final Design
 (Sheet 3 of 5)

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

| | | | |
|--|---|--|---|
|  | US 321 (N. Chester Steet) at Radio Street | |  |
| | Division 12 Gaston Co. | Gastonia | |
| Prepared for:  | PLAN DATE: September 2016 PREPARED BY: J.A. Wagner | REVIEWED BY: T.R. Terrell REVIEWED BY: N.R. Simmons | DATE: 12/16/2016 SIGNATURE: _____ DATE: _____ |
| REVISIONS | | INIT. | DATE |
| 750 N. Greenfield Pkwy, Garner, NC 27529 | | SIG. INVENTORY NO. 12-1623 | |

ALTERNATE PHASING ACTIVATION DETAIL

TO RUN ALT. PHASING DURING COORDINATION - SELECT ALL PAGE CHANGES (AS SHOWN BELOW) WITHIN COORDINATION PLAN PROGRAMMING.

TO RUN ALT. PHASING DURING FREE RUN - PROGRAM PAGE CHANGES (SHOWN BELOW) IN SEPARATE TIME OF DAY EVENTS. IF PAGE 1 IS USED, NO EVENT PROGRAMMING IS NECESSARY FOR THAT PARTICULAR PAGE.

| <u>PHASING</u> | <u>INPUTS PAGE</u> | <u>OVERLAPS PAGE</u> |
|---|--------------------|----------------------|
| ACTIVE PAGES REQUIRED TO RUN <u>DEFAULT PHASING</u> | 1 | 1 |
| ACTIVE PAGES REQUIRED TO RUN <u>ALTERNATE PHASING</u> | 2 | 2 |

NOTE: PAGES NOT SHOWN (i.e. sequence, phase control, etc.) SHOULD REMAIN AS '1', OR AS DEFINED BY TIMING ENGINEER.

IMPORTANT: IF ALT. PHASING IS USED DURING FREE RUN AND COORDINATION, DO NOT OPERATE TIME OF DAY PAGE CHANGE EVENTS CONCURRENTLY WITH COORDINATION PLAN EVENTS IN THE EVENT SCHEDULER. (EX. FREE RUN PAGE CHANGE EVENT SHOULD END BEFORE COORDINATION PLAN EVENT STARTS AND VICE-VERSA).

ALTERNATE PHASING PAGE CHANGE SUMMARY

THE FOLLOWING IS A SUMMARY OF WHAT TAKES PLACE WHEN THESE OVERLAP/INPUT PAGE CHANGES ACTIVATE TO CALL THE "ALTERNATE PHASING":

OVERLAPS PAGE 2: Modifies overlap parent phases for heads 11 and 51 to run protected turns only.

INPUTS PAGE 2: Disables phase 6 call on loop 1A and reduces delay time for phase 1 call on loop 1A to 3 seconds.


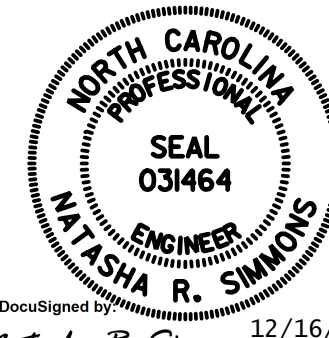
Disables phase 2 call on loop 5A and reduces delay time for phase 5 call on loop 5A to 3 seconds.

THIS ELECTRICAL DETAIL IS FOR THE SIGNAL DESIGN: 12-1623
 DESIGNED: September 2016
 SEALED: 12-16-2016
 REVISED:

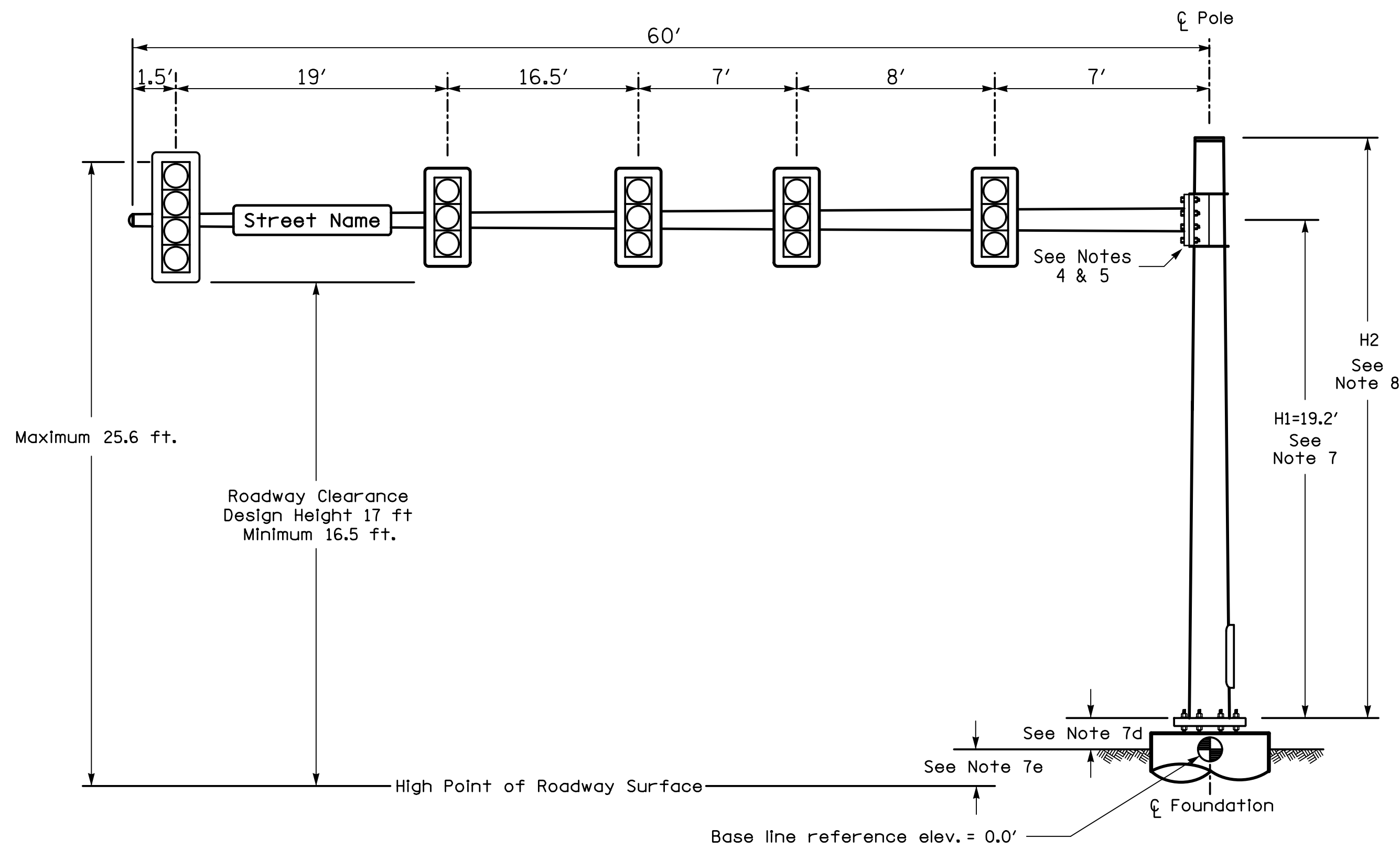
Signal Upgrade - Final Design
 (Sheet 5 of 5)

**DOCUMENT NOT CONSIDERED FINAL
 UNLESS ALL SIGNATURES COMPLETED**

HNTB HNTB NORTH CAROLINA, P.C.
 343 E. Six Forks Road, Suite 200
 Raleigh, North Carolina 27609
 NC License No: C-1554
 (919) 546-8997

| | | |
|--|---|---|
| ELECTRICAL AND PROGRAMMING DETAILS FOR: Prepared for:  750 N. Greenfield Pkwy, Garner, NC 27529 | US 321 (N. Chester Steet) at Radio Street Division 12 Gaston Co. Gastonia PLAN DATE: September 2016 REVIEWED BY: T.R. Terrell PREPARED BY: J.A. Wagner REVIEWED BY: N.R. Simmons | SEAL  NATASHA R. SIMMONS ENGINEER |
| REVISIONS INIT. DATE | | DocuSigned by: Signature: <i>Natasha R. Simmons</i> DATE: 12/16/2016 SIG. INVENTORY NO. 12-1623 |

Design Loading for METAL POLE NO. 11



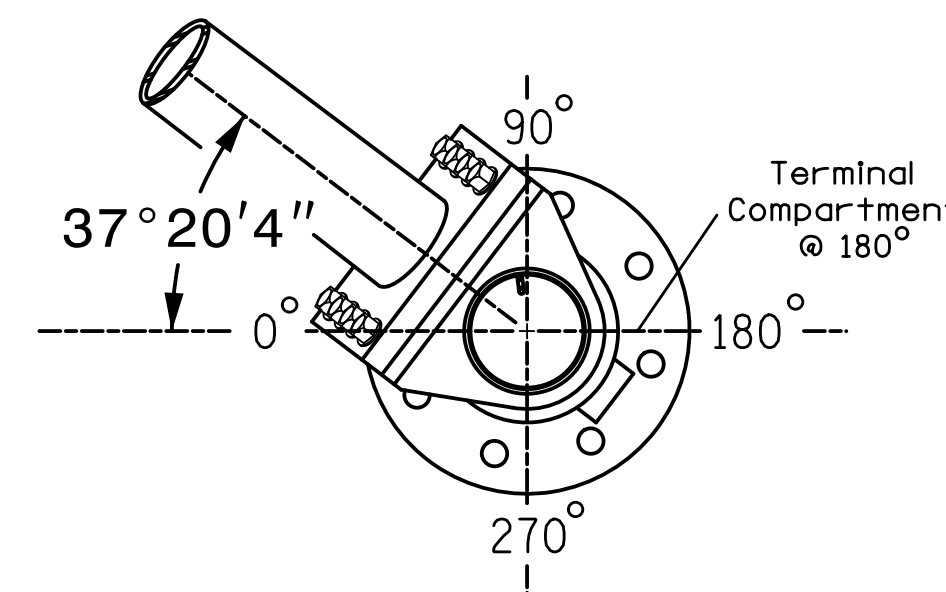
Elevation View

SPECIAL NOTE

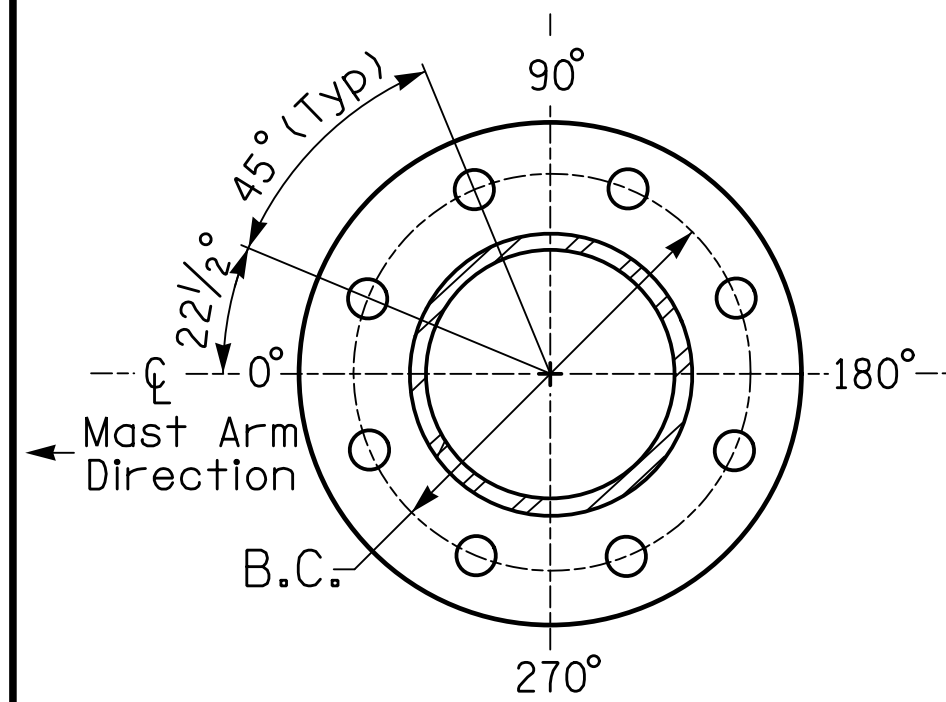
The contractor is responsible for verifying that the mast arm attachment height (H1) will provide the "Design Height" clearance from the roadway before submitting final shop drawings for approval. Verify elevation data below which was obtained by field measurement or from available project survey data.

Elevation Data for Mast Arm Attachment (H1)

| Elevation Differences for: | Pole 11 |
|--|-----------|
| Baseline reference point at ϕ Foundation @ ground level | 0.0 ft. |
| Elevation difference at High point of roadway surface | +0.20 ft. |
| Elevation difference at Edge of travelway or face of curb | +0.35 ft. |

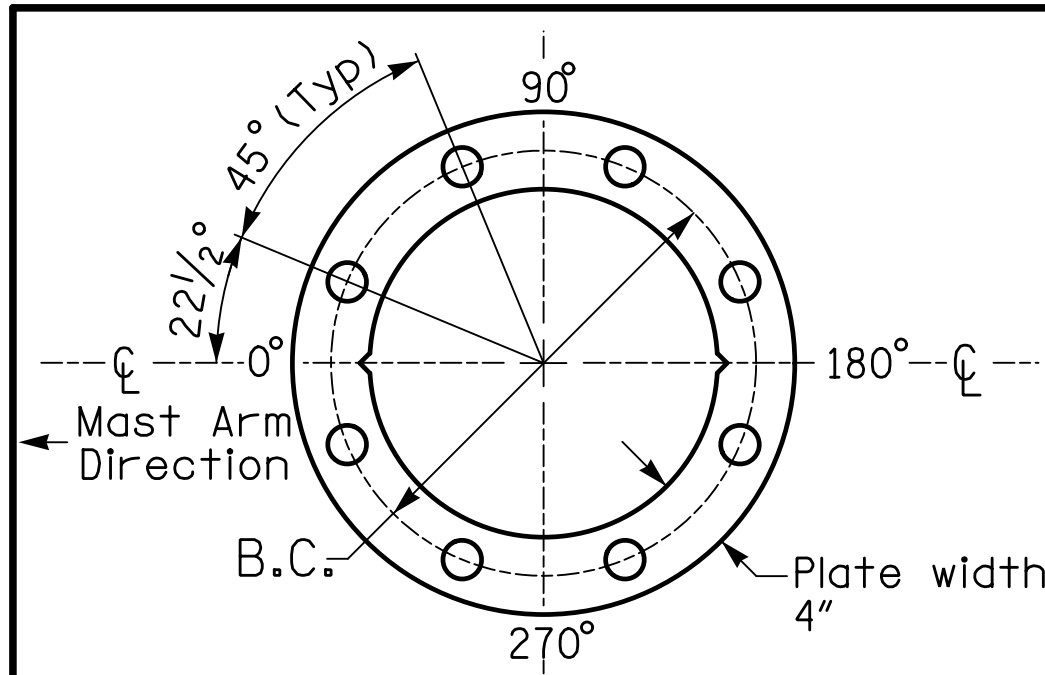


POLE RADIAL ORIENTATION



8 BOLT BASE PLATE DETAIL

See Note 6



BASE PLATE TEMPLATE & ANCHOR BOLT LOCK PLATE DETAIL
For 8 Bolt Base Plate

METAL POLE No. 11

| PROJECT REFERENCE NO. | SHEET NO. |
|-----------------------|-----------|
| I-5000 | Sig. 24.6 |

MAST ARM LOADING SCHEDULE

| LOADING SYMBOL | DESCRIPTION | AREA | SIZE | WEIGHT |
|----------------|---|-----------|-------------------------|--------|
| | RIGID MOUNTED SIGNAL HEAD 12"-4 SECTION-WITH BACKPLATE | 11.5 S.F. | 25.5" W X 66.0" L | 74 LBS |
| | RIGID MOUNTED SIGNAL HEAD 12"-3 SECTION-WITH BACKPLATE | 9.3 S.F. | 25.5" W X 52.5" L | 60 LBS |
| | STREET NAME SIGN RIGID MOUNTED | 16.0 S.F. | 24.0" W X 96.0" L | 36 LBS |

NOTES

DESIGN REFERENCE MATERIAL

- Design the traffic signal structure and foundation in accordance with:
 - The 6th Edition 2013 AASHTO "Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals, including all of the latest interim revisions.
 - The 2012 NCDOT "Standard Specifications for Roads and Structures." The latest addenda to the specifications can be found in the traffic signal project special provisions.
 - The 2012 NCDOT Roadway Standard Drawings.
 - The traffic signal project plans and special provisions.
 - The NCDOT "Metal Pole Standards" located at the following NCDOT website: <https://connect.ncdot.gov/resources/safety/Pages/ITS-Design-Resources.aspx>

DESIGN REQUIREMENTS

- Design the traffic signal structure using the loading conditions shown in the elevation views. These are anticipated worst case "design loads" and may not represent the actual loads that will be applied at the time of the installation. The contractor should refer to the traffic signal plans for the actual loads that will be applied at the time of the installation.
- Design all signal supports using stress ratios that do not exceed 0.9.
- The camber design for the mast arm deflection should provide an appearance of a low pitched arch where the tip or the free end of the mast arm does not deflect below horizontal when fully loaded.
- A clamp-type bolted mast arm-to-pole connection may be used instead of the welded ring stiffened box connection shown as long as the connection meets all of the design requirements.
- Design base plate with 8 anchor bolt holes. Provide 2 inch x 60 inch anchor bolts.
- The mast arm attachment height (H1) shown is based on the following design assumptions:
 - Mast arm slope and deflection are not considered in determining the arm attachment height as they are assumed to offset each other.
 - Signal heads are rigidly mounted and vertically centered on the mast arm.
 - The roadway clearance height for design is as shown in the elevation views.
 - The top of the pole base plate is 0.75 feet above the ground elevation.
 - Refer to the Elevation Data Chart for the elevation differences between the proposed foundation ground level and the high point of the roadway.
- The pole manufacturer will determine the total height (H2) of each pole using the greater of the following:
 - Mast arm attachment height (H1) plus 2 feet, or
 - H1 plus 1/2 of the total height of the mast arm attachment assembly plus 1 foot.
- If pole location adjustments are required, the contractor must gain approval from the Engineer as this may affect the mast arm lengths and arm attachment heights. The contractor may contact the Signal Design Section Senior Structural Engineer for assistance at (919) 773-2800.
- The contractor is responsible for verifying that the mast arm length shown will allow proper positioning of the signal heads over the roadway.
- The contractor is responsible for providing soil penetration testing data (SPT) to the pole manufacturer so site specific foundations can be designed.

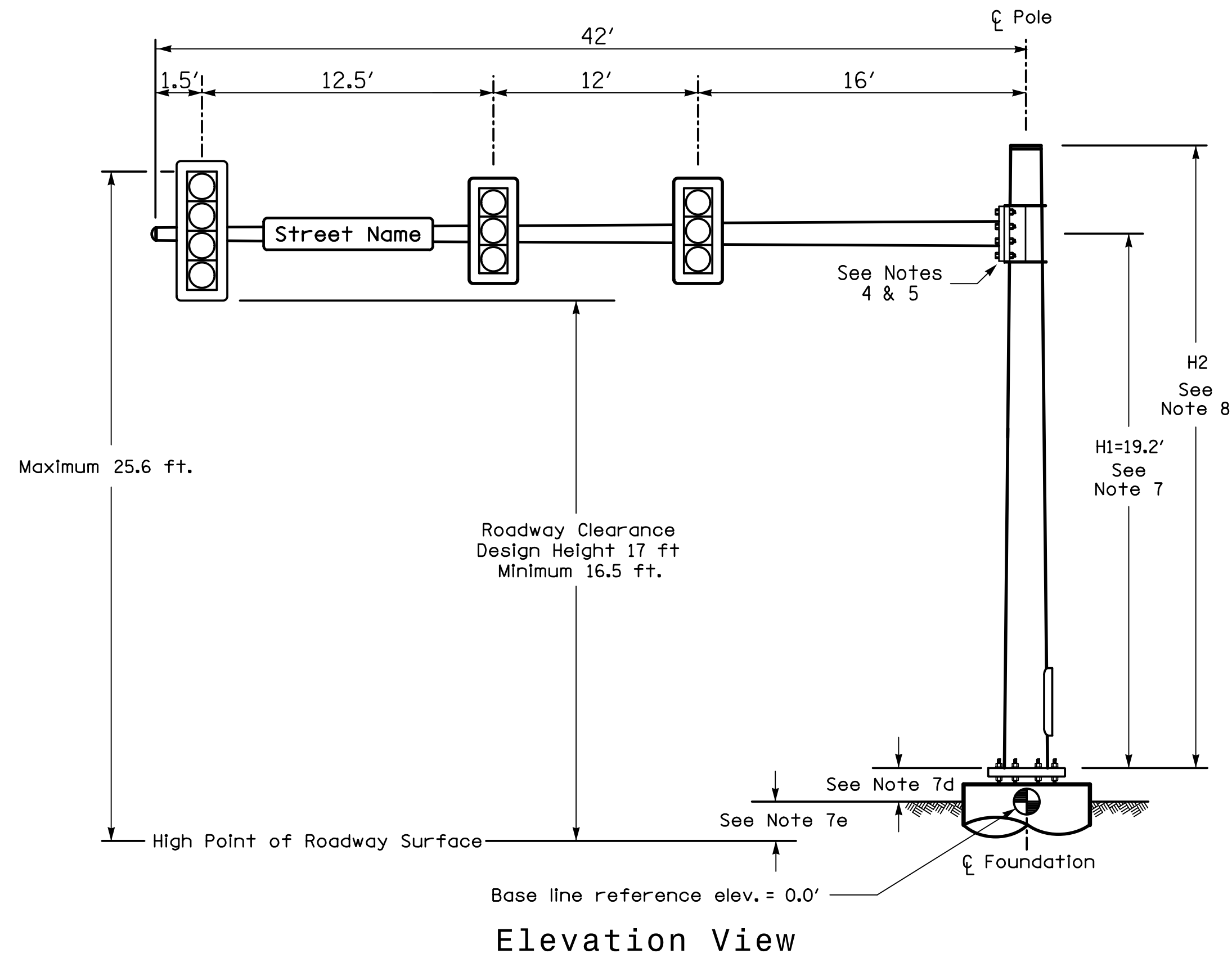
All metal poles and arms should be black in color as specified in the project special provisions.

NCDOT Wind Zone 4 (90 mph)

**DOCUMENT NOT CONSIDERED FINAL
UNLESS ALL SIGNATURES COMPLETED**

| | | | |
|------------------------|--|--|--|
| | US 321 (N. Chester Street) at Radio Street | | |
| | Division 12 Gaston Co. Gastonia | PLAN DATE: September 2016 REVIEWED BY: A.D. Klinksiek PREPARED BY: T.R. Terrell REVIEWED BY: N.R. Simmons | |
| SCALE 0 N/A NONE | REVISIONS INIT. DATE | REVISIONS INIT. DATE | Digitized by: Signature: <i>Natasha R. Simmons</i> DATE: 11/8/2016 SIG. INVENTORY NO. 12-1623 |

Design Loading for METAL POLE NO. 12

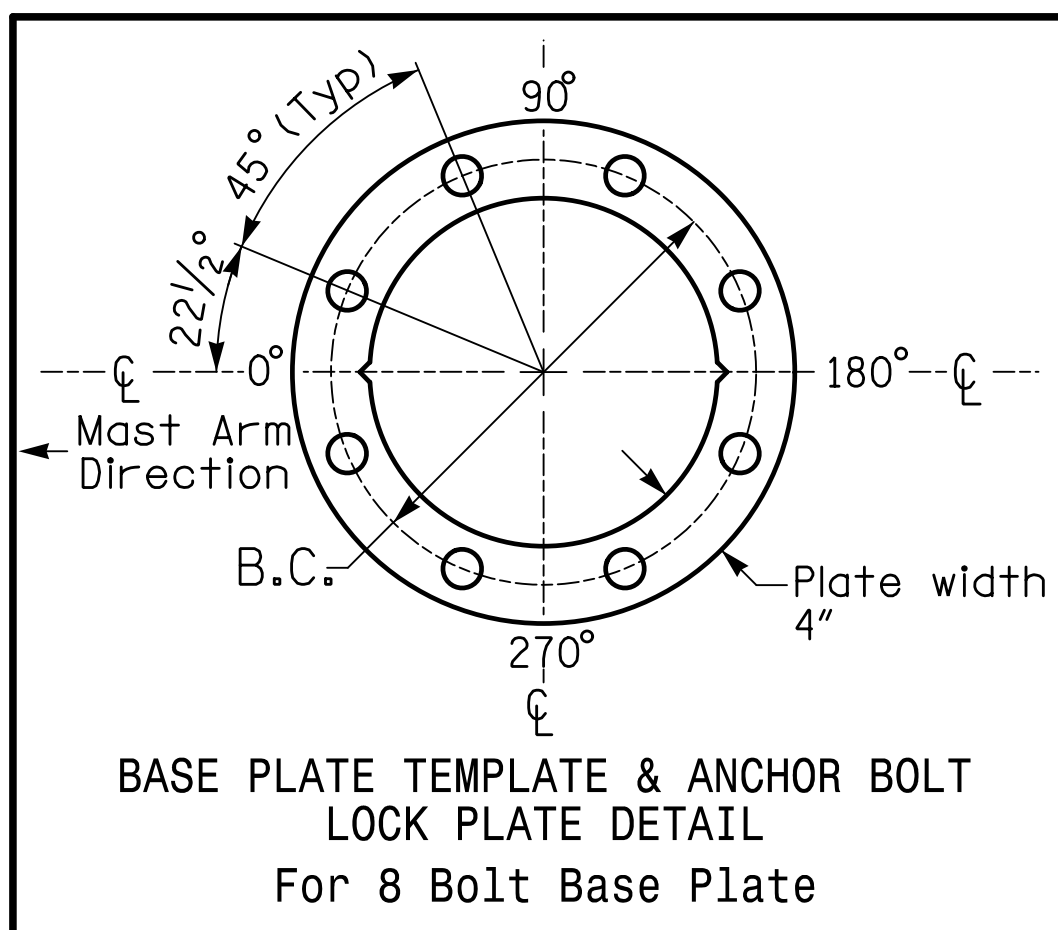
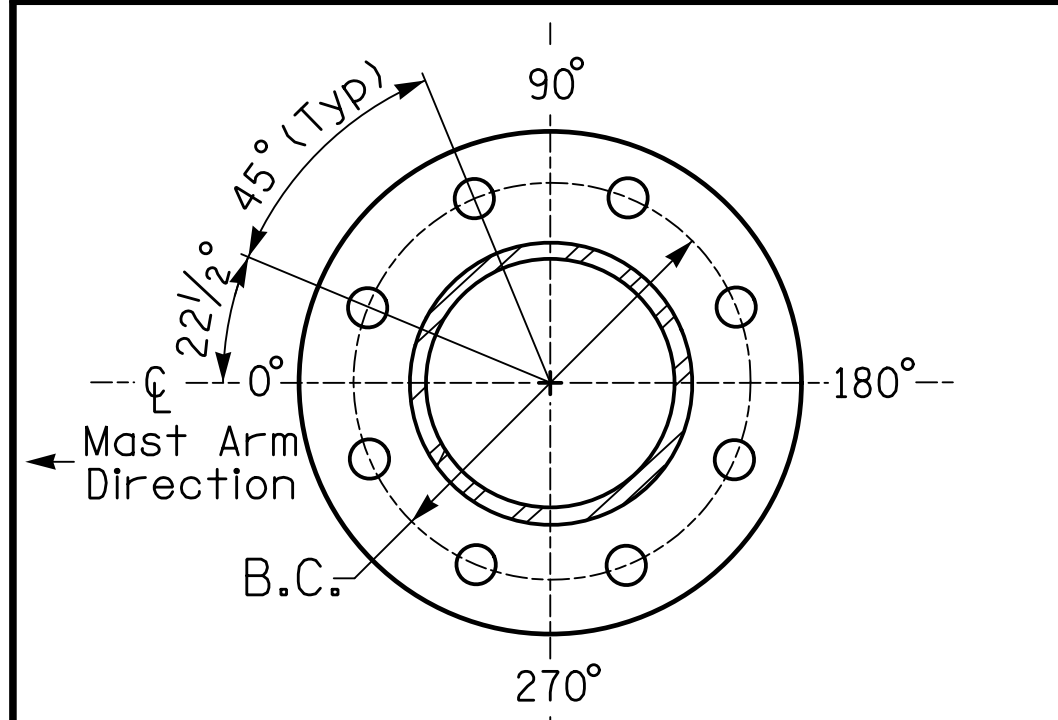
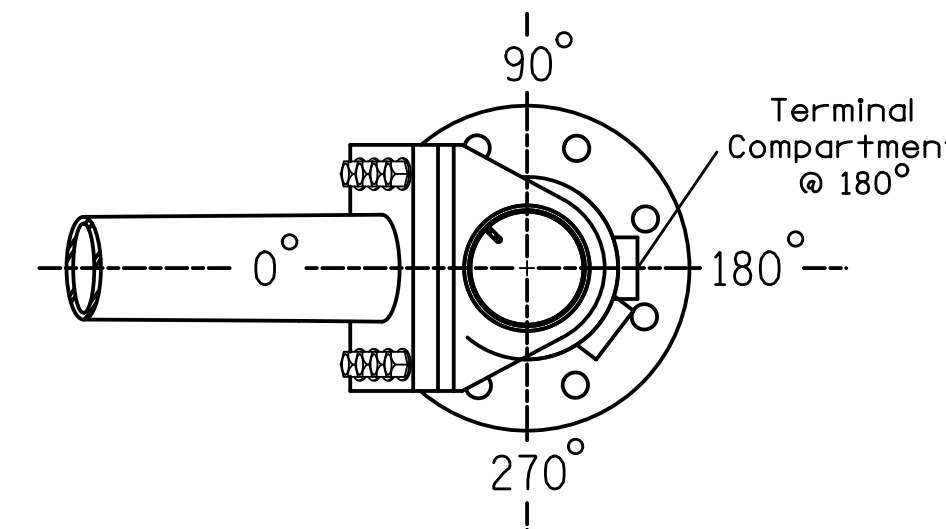


SPECIAL NOTE

The contractor is responsible for verifying that the mast arm attachment height (H1) will provide the "Design Height" clearance from the roadway before submitting final shop drawings for approval. Verify elevation data below which was obtained by field measurement or from available project survey data.

Elevation Data for Mast Arm Attachment (H1)

| Elevation Differences for: | Pole 12 |
|--|-----------|
| Baseline reference point at ϕ Foundation @ ground level | 0.0 ft. |
| Elevation difference at High point of roadway surface | +0.17 ft. |
| Elevation difference at Edge of travelway or face of curb | +0.42 ft. |



METAL POLE No. 12

| PROJECT REFERENCE NO. | SHEET NO. |
|-----------------------|-----------|
| I-5000 | Sig. 24.7 |

MAST ARM LOADING SCHEDULE

| LOADING SYMBOL | DESCRIPTION | AREA | SIZE | WEIGHT |
|----------------|--|-----------|-------------------|--------|
| | RIGID MOUNTED SIGNAL HEAD 12"-4 SECTION-WITH BACKPLATE | 11.5 S.F. | 25.5" W X 66.0" L | 74 LBS |
| | RIGID MOUNTED SIGNAL HEAD 12"-3 SECTION-WITH BACKPLATE | 9.3 S.F. | 25.5" W X 52.5" L | 60 LBS |
| | STREET NAME SIGN RIGID MOUNTED | 16.0 S.F. | 24.0" W X 96.0" L | 36 LBS |

NOTES

DESIGN REFERENCE MATERIAL

- Design the traffic signal structure and foundation in accordance with:
 - The 6th Edition 2013 AASHTO "Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals, including all of the latest interim revisions.
 - The 2012 NCDOT "Standard Specifications for Roads and Structures." The latest addenda to the specifications can be found in the traffic signal project special provisions.
 - The 2012 NCDOT Roadway Standard Drawings.
 - The traffic signal project plans and special provisions.
 - The NCDOT "Metal Pole Standards" located at the following NCDOT website: <https://connect.ncdot.gov/resources/safety/Pages/ITS-Design-Resources.aspx>

DESIGN REQUIREMENTS

- Design the traffic signal structure using the loading conditions shown in the elevation views. These are anticipated worst case "design loads" and may not represent the actual loads that will be applied at the time of the installation. The contractor should refer to the traffic signal plans for the actual loads that will be applied at the time of the installation.
- Design all signal supports using stress ratios that do not exceed 0.9.
- The camber design for the mast arm deflection should provide an appearance of a low pitched arch where the tip or the free end of the mast arm does not deflect below horizontal when fully loaded.
- A clamp-type bolted mast arm-to-pole connection may be used instead of the welded ring stiffened box connection shown as long as the connection meets all of the design requirements.
- Design base plate with 8 anchor bolt holes. Provide 2 inch x 60 inch anchor bolts.
- The mast arm attachment height (H1) shown is based on the following design assumptions:
 - Mast arm slope and deflection are not considered in determining the arm attachment height as they are assumed to offset each other.
 - Signal heads are rigidly mounted and vertically centered on the mast arm.
 - The roadway clearance height for design is as shown in the elevation views.
 - The top of the pole base plate is 0.75 feet above the ground elevation.
- Refer to the Elevation Data Chart for the elevation differences between the proposed foundation ground level and the high point of the roadway.
- The pole manufacturer will determine the total height (H2) of each pole using the greater of the following:
 - Mast arm attachment height (H1) plus 2 feet, or
 - H1 plus 1/2 of the total height of the mast arm attachment assembly plus 1 foot.
- If pole location adjustments are required, the contractor must gain approval from the Engineer as this may affect the mast arm lengths and arm attachment heights. The contractor may contact the Signal Design Section Senior Structural Engineer for assistance at (919) 773-2800.
- The contractor is responsible for verifying that the mast arm length shown will allow proper positioning of the signal heads over the roadway.
- The contractor is responsible for providing soil penetration testing data (SPT) to the pole manufacturer so site specific foundations can be designed.

All metal poles and arms should be black in color as specified in the project special provisions.

NCDOT Wind Zone 4 (90 mph)

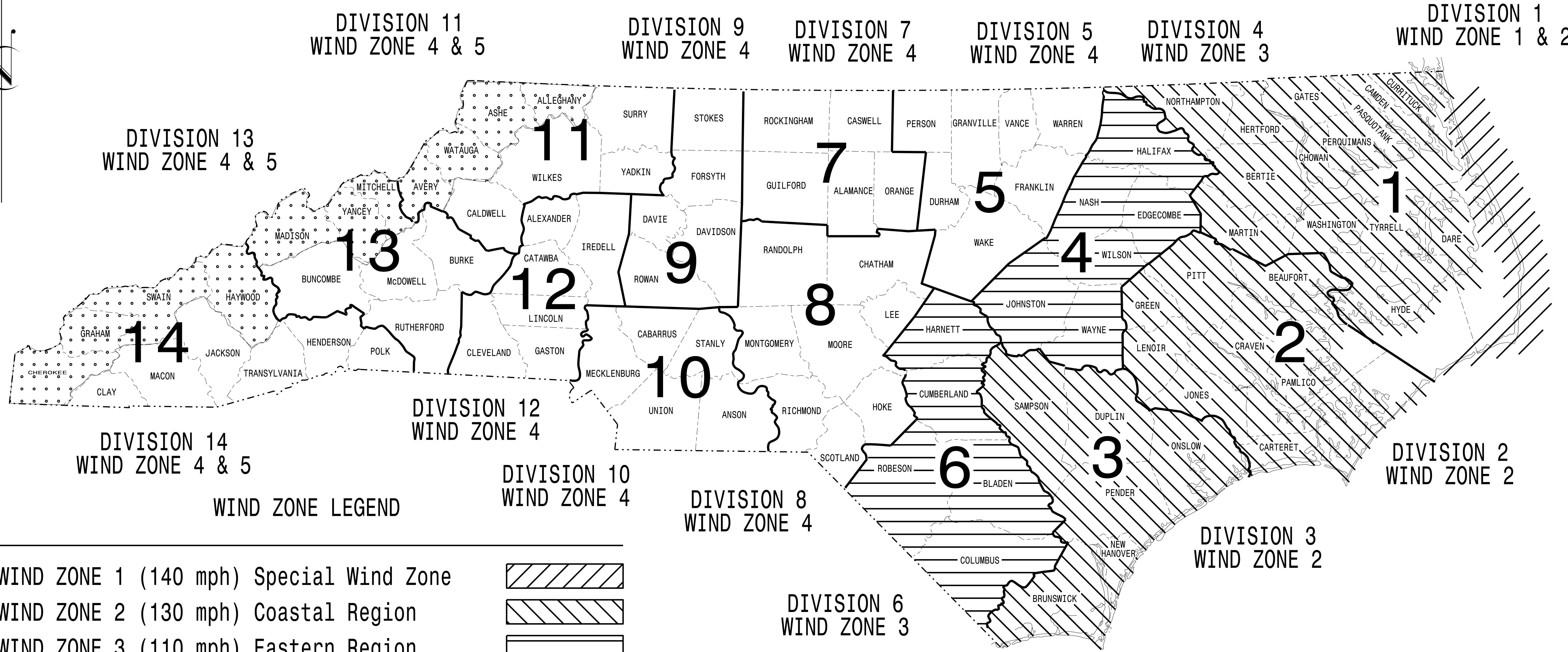
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

| | | | |
|------------------------|--|--|---|
| | US 321 (N. Chester Street) at Radio Street | | |
| | Division 12 Gaston Co. Gastonia | PLAN DATE: September 2016 REVIEWED BY: A.D. Klinksiek PREPARED BY: T.R. Terrell REVIEWED BY: N.R. Simmons | |
| SCALE 0 N/A NONE | REVISIONS INIT. DATE | REVISIONS INIT. DATE | Documented by: 11/8/2016 Signature: <i>Natasha R. Simmons</i> DATE: _____ SIG. INVENTORY NO. 12-1623 |

STATE OF NORTH CAROLINA DIVISION OF HIGHWAYS

| | |
|------------------|-----------|
| PROJECT I.D. NO. | SHEET NO. |
| I-5000 | Sig.M1 |

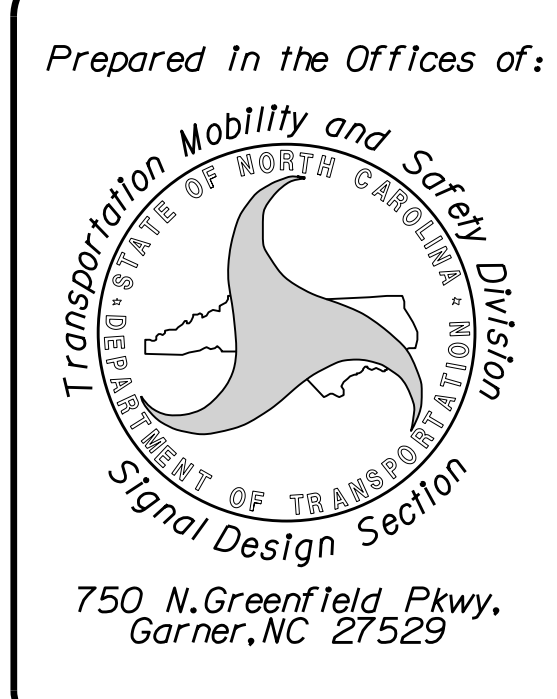
STANDARD DRAWINGS FOR ALL METAL POLES



WIND ZONE LEGEND

| | |
|--|--|
| WIND ZONE 1 (140 mph) Special Wind Zone | |
| WIND ZONE 2 (130 mph) Coastal Region | |
| WIND ZONE 3 (110 mph) Eastern Region | |
| WIND ZONE 4 (90 mph) Central & Mtn. Region | |
| WIND ZONE 5 (120 mph) Special Wind Zone | |

<https://connect.ncdot.gov/resources/safety/Pages/ITS-Design-Resources.aspx>



Designed in conformance with the latest 2015 Interim to the 6th Edition 2013

AASHTO

Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals

INDEX OF PLANS

| DRAWING NUMBER | DESCRIPTION |
|----------------|---|
| Sig. M 1 | Statewide Wind Zone Map |
| Sig. M 2 | Typical Fabrication Details-All Metal Poles |
| Sig. M 3 | Typical Fabrication Details-Strain Poles |
| Sig. M 4 | Typical Fabrication Details-Mast Arm Poles |
| Sig. M 5 | Typical Fabrication Details-Mast Arm Connection |
| Sig. M 6 | Typical Fabrication Details-Strain Pole Attachments |
| Sig. M 7 | Construction Details-Foundations |
| Sig. M 8 | Standard Strain Pole Foundation-All Soil Conditions |

NCDOT CONTACTS:

MOBILITY AND SAFETY DIVISION - ITS AND SIGNALS UNIT

G. A. FULLER, P.E. - STATE ITS AND SIGNALS ENGINEER

G. G. MURR, JR., P.E. - STATE SIGNALS ENGINEER

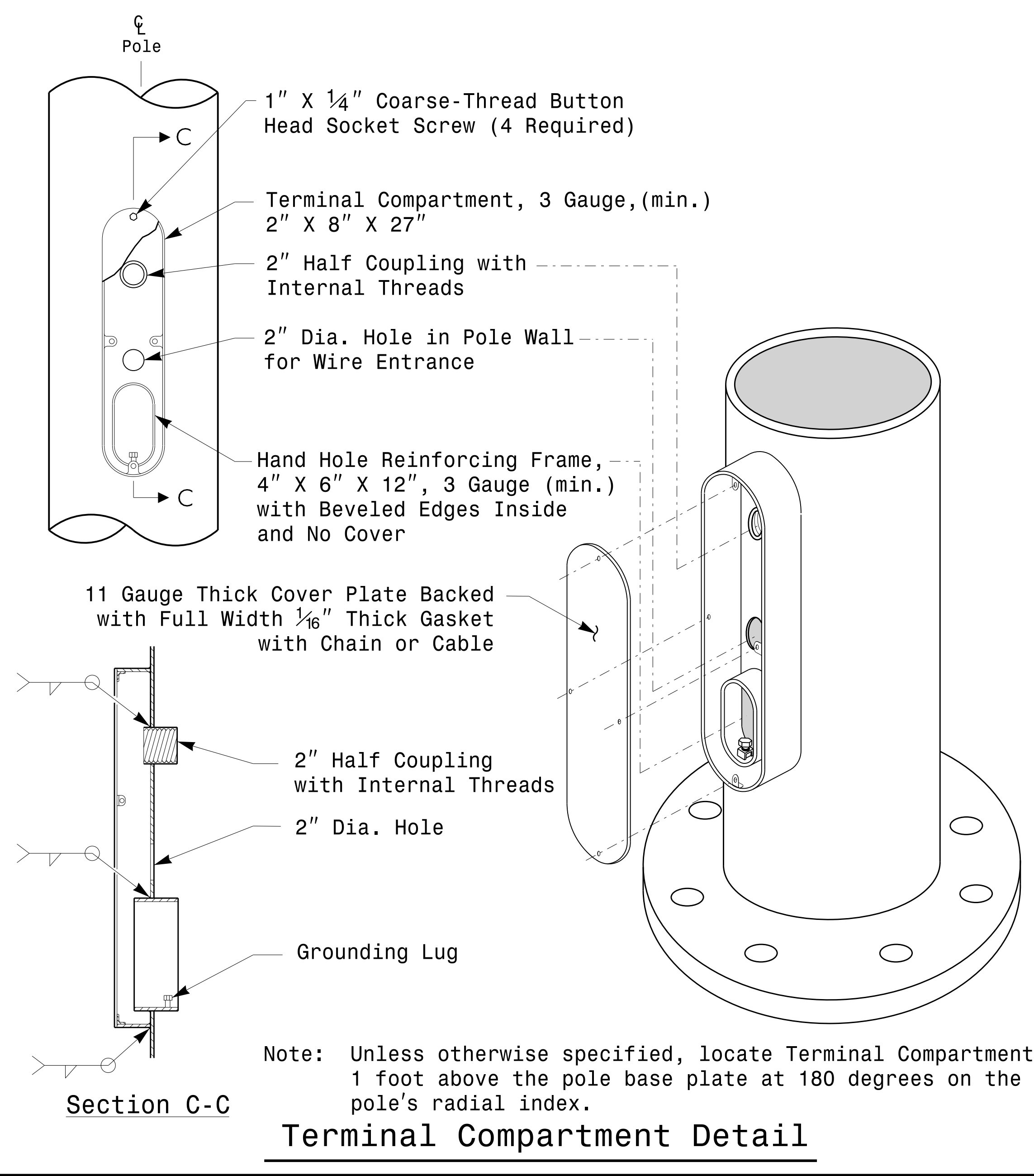
D.C. SARKAR, P.E. - ITS AND SIGNALS SENIOR STRUCTURAL ENGINEER

C.F. ANDREWS - ITS AND SIGNALS JOURNEY STRUCTURAL ENGINEER

SEAL

DocuSigned by:
Debesh C. Sarkar

2/17/2016
DATE



| | |
|---------------------------|------------------------|
| MFG _____ | MFG. DATE: MM/YY _____ |
| SHAFT D/T/L/Y _____ | _____ |
| ARM-A D/T/L/Y _____ | _____ |
| ARM-B D/T/L/Y _____ | _____ |
| A.B. DIA./B.C./L/Y _____ | _____ |
| NCDOT SIG. INV. NO. _____ | _____ |
| NCDOT POLE NO. _____ | _____ |

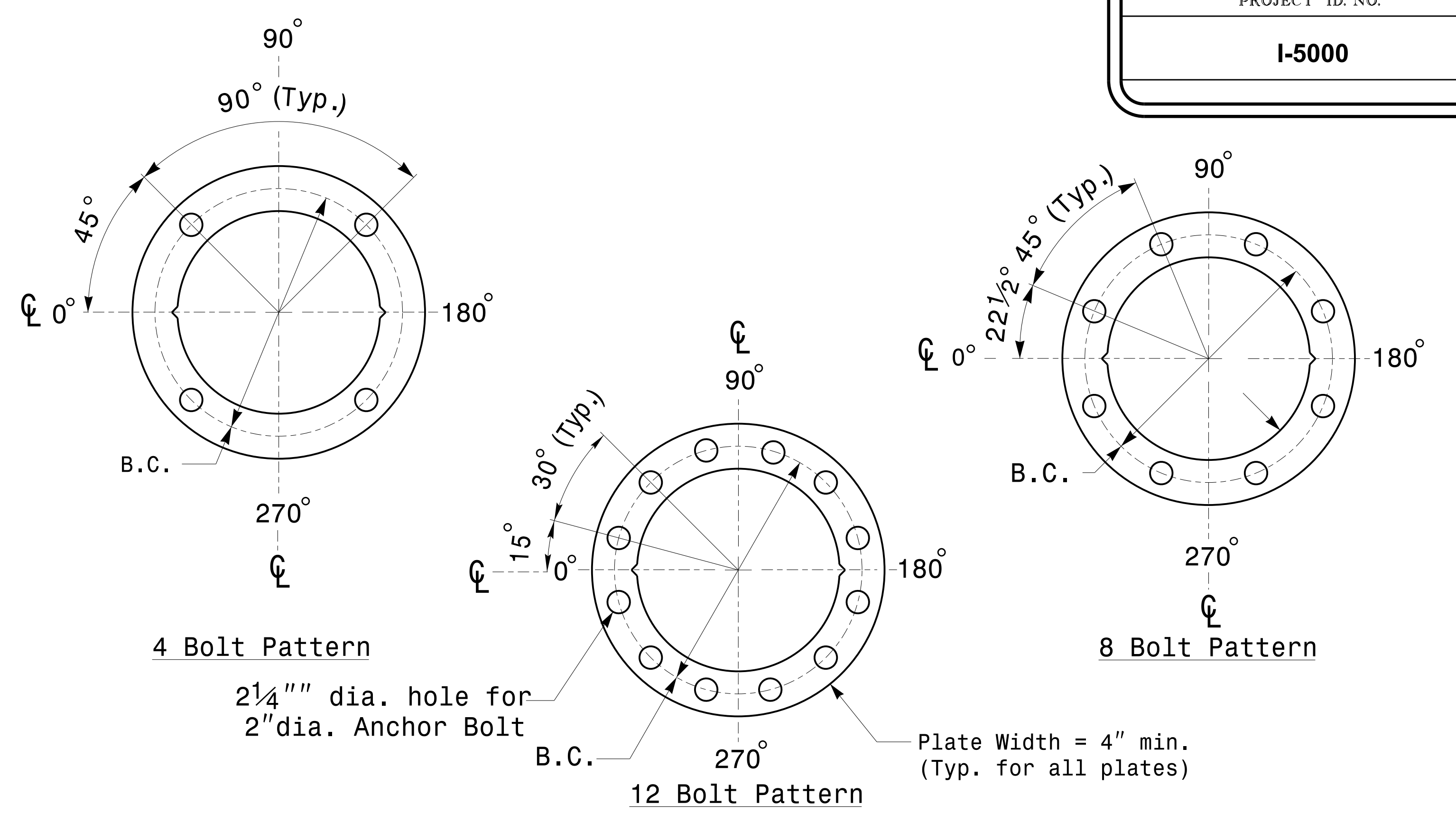
Shaft I.D. Tag
(Provide on Shaft of Strain Poles and Mast Arm Poles Shaft)

- Notes:
- 1) D= Diameter, T= Thickness, L= Length, Y= Yield Strength
 - 2) A.B. = Anchor Bolt
 - 3) B.C. = Bolt Circle of Anchor Bolts
 - 4) If Custom Design, use "NCDOT STANDARD" line for Signal Inv. Number and pole I.D. number
 - 5) See drawing M3 and M4 for mounting positions of I.D. tags.

Identification Tag Details

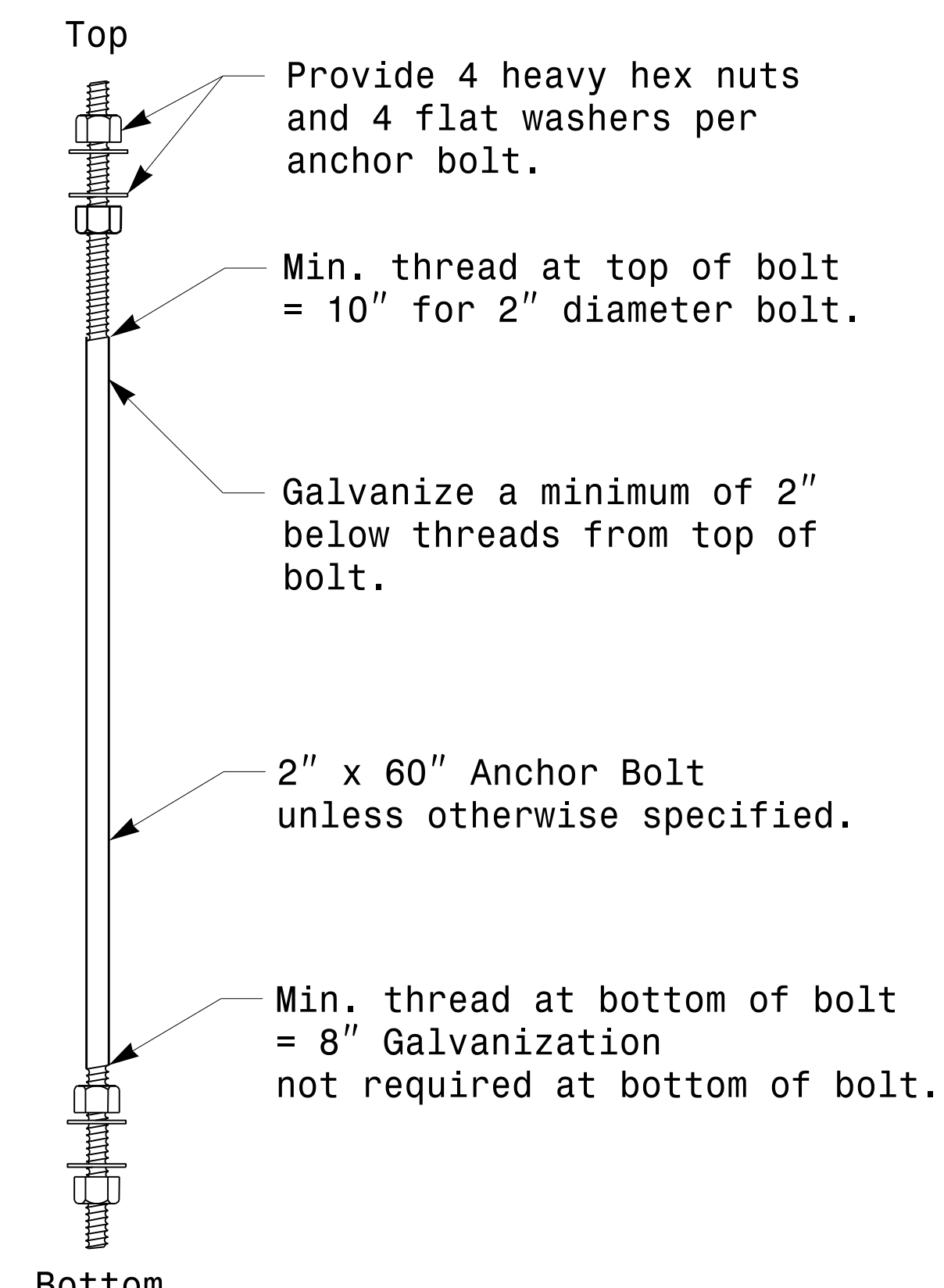
| | |
|---------------------------|-----------------------|
| MFG _____ | MFG. DATE:MM/YY _____ |
| SECTION D/T/L/Y _____ | _____ |
| NCDOT SIG. INV. NO. _____ | _____ |
| NCDOT POLE NO. _____ | _____ |

Arm I.D. Tag
(Provide on each section of a multi-section mast arm.)

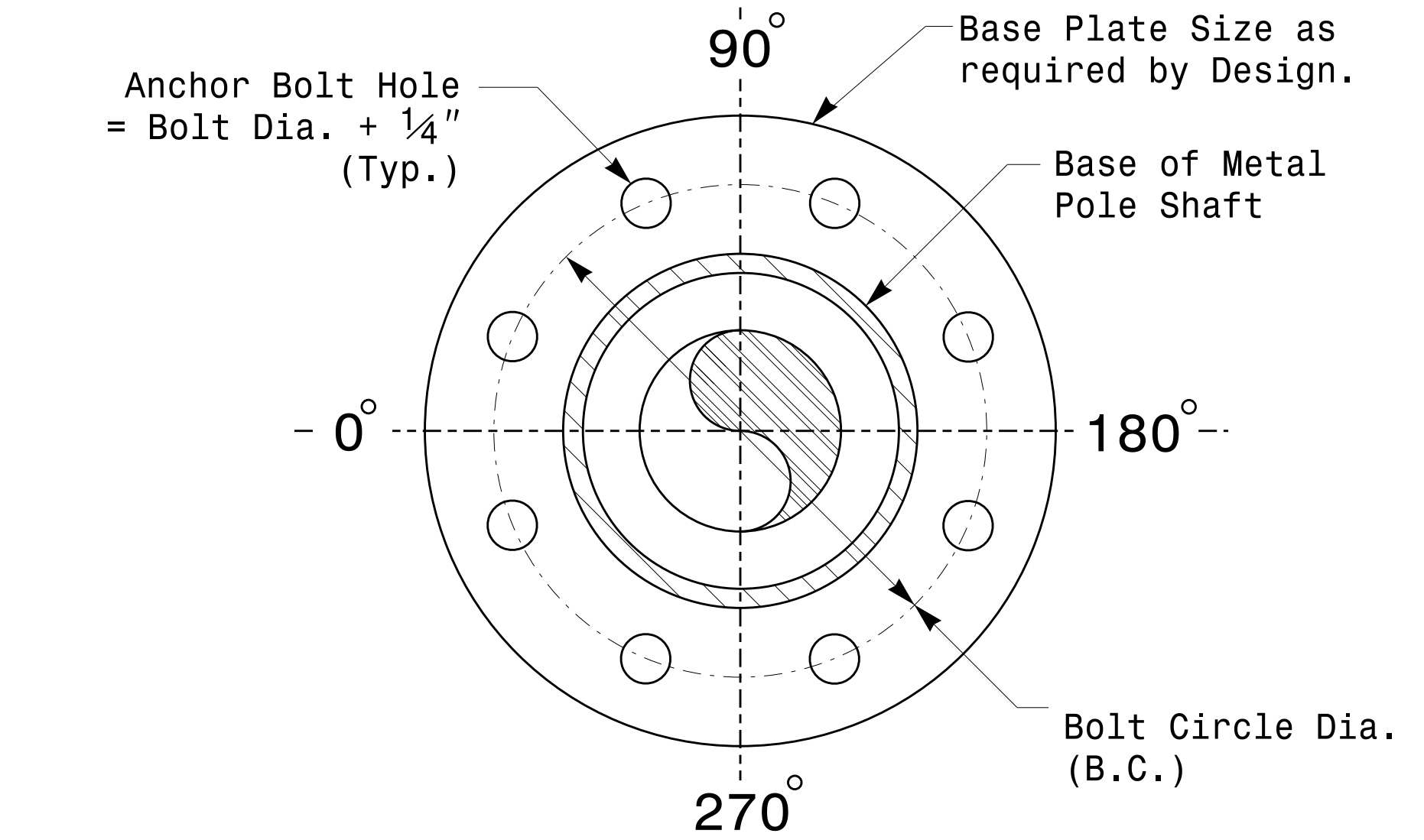


Construct Templates and Plates from 1/4 inch min. thick Steel. Galvanizing is not required.

Base Plate Template and Anchor Bolt Lock Plate Details



Anchor Bolt Detail



Note: Base plate may be circular, octagonal, square or rectangular in shape.

Typical Base Plate Detail

Prepared in the Offices of:

750 N. Greenfield Pkwy, Garner, NC 27529

| | |
|---|---------------------------|
| Typical Fabrication Details For All Metal Poles | |
| PLAN DATE: FEBRUARY 2016 | DESIGNED BY: C.F. ANDREWS |
| PREPARED BY: N. BITTING | REVIEWED BY: D.C. SARKAR |
| REVISIONS | INIT. DATE |

SEAL

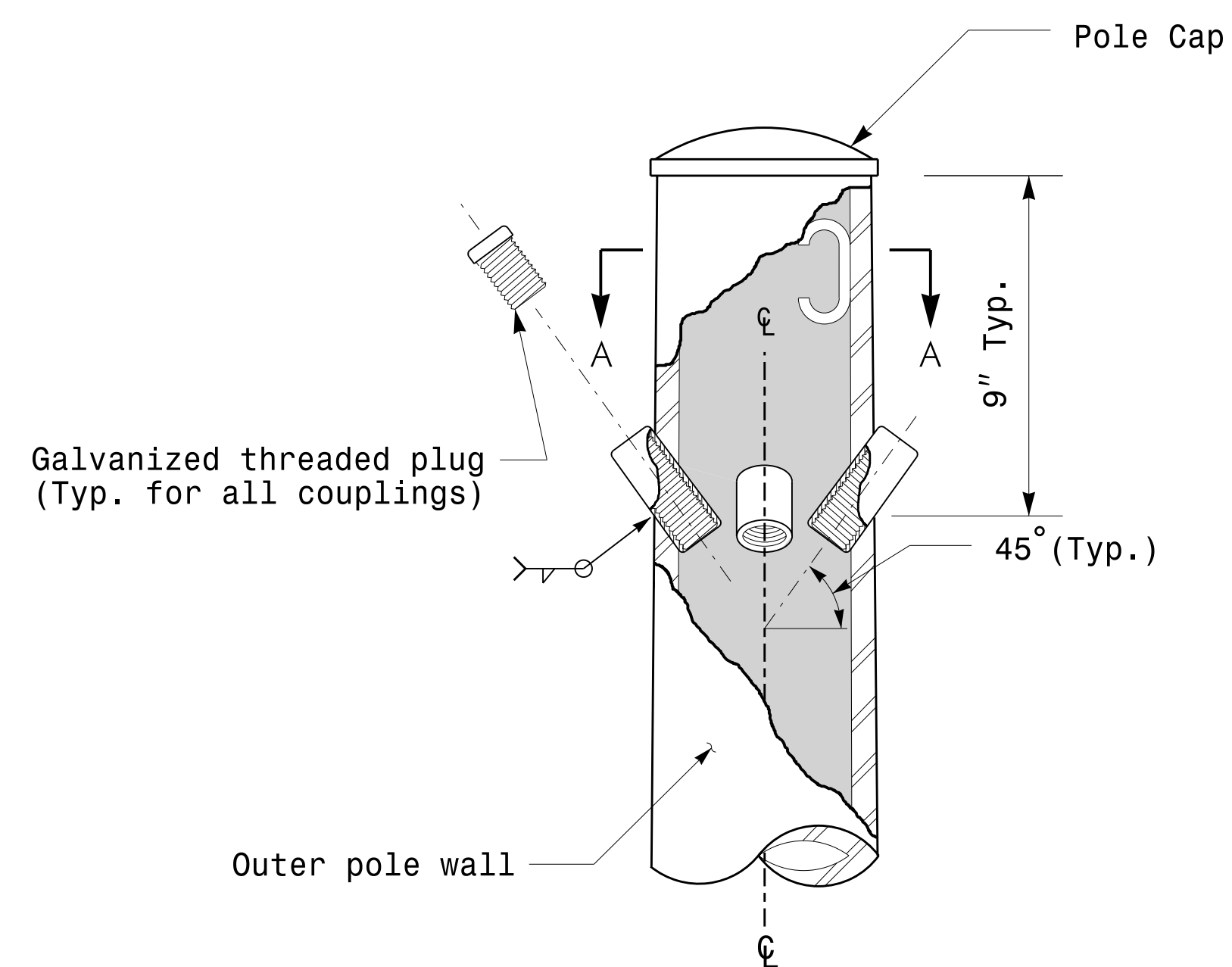
DocuSigned by: Debesh C. Sarkar

44E8E32E147E4C4...

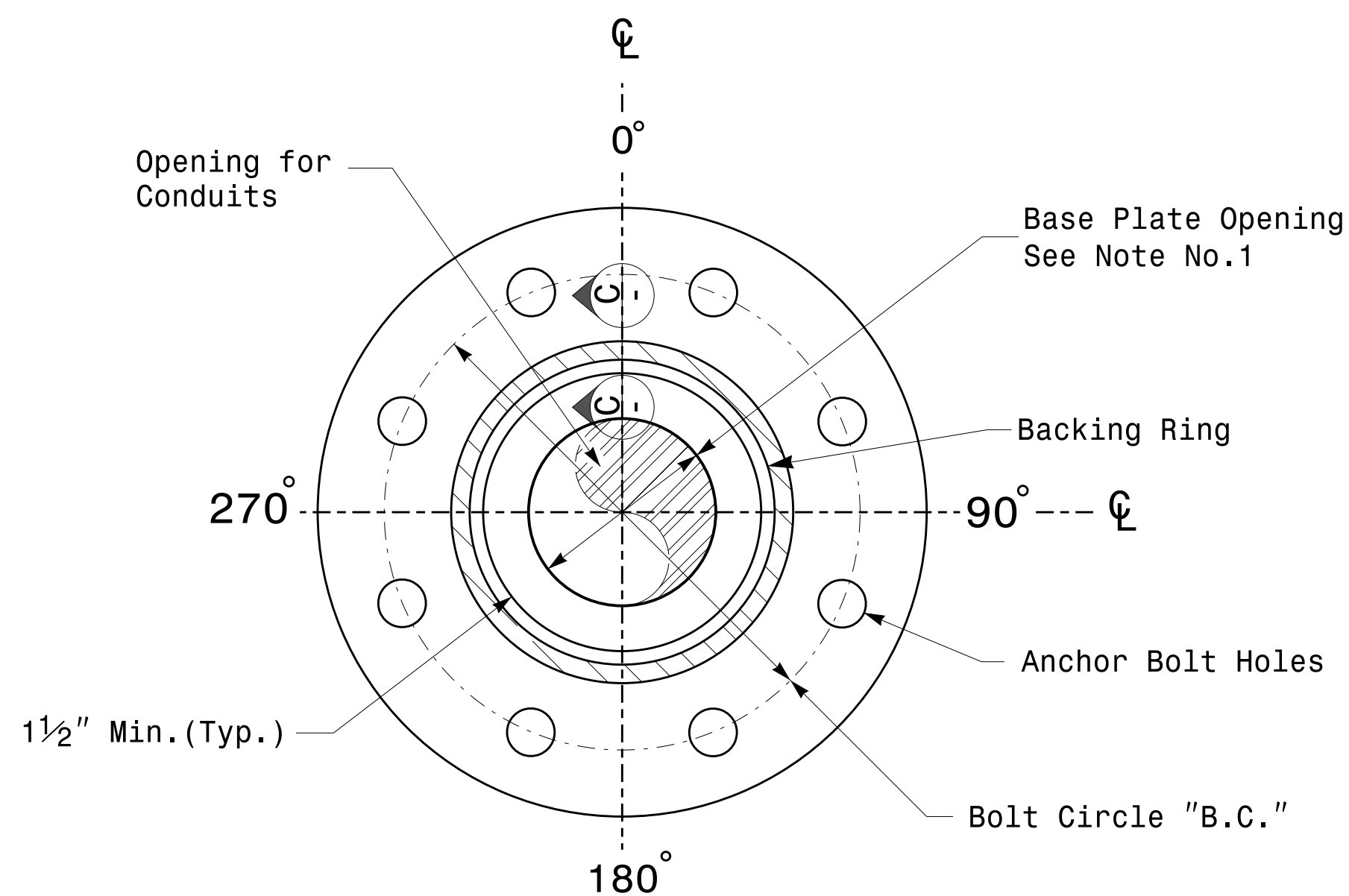
2/17/2016 DATE

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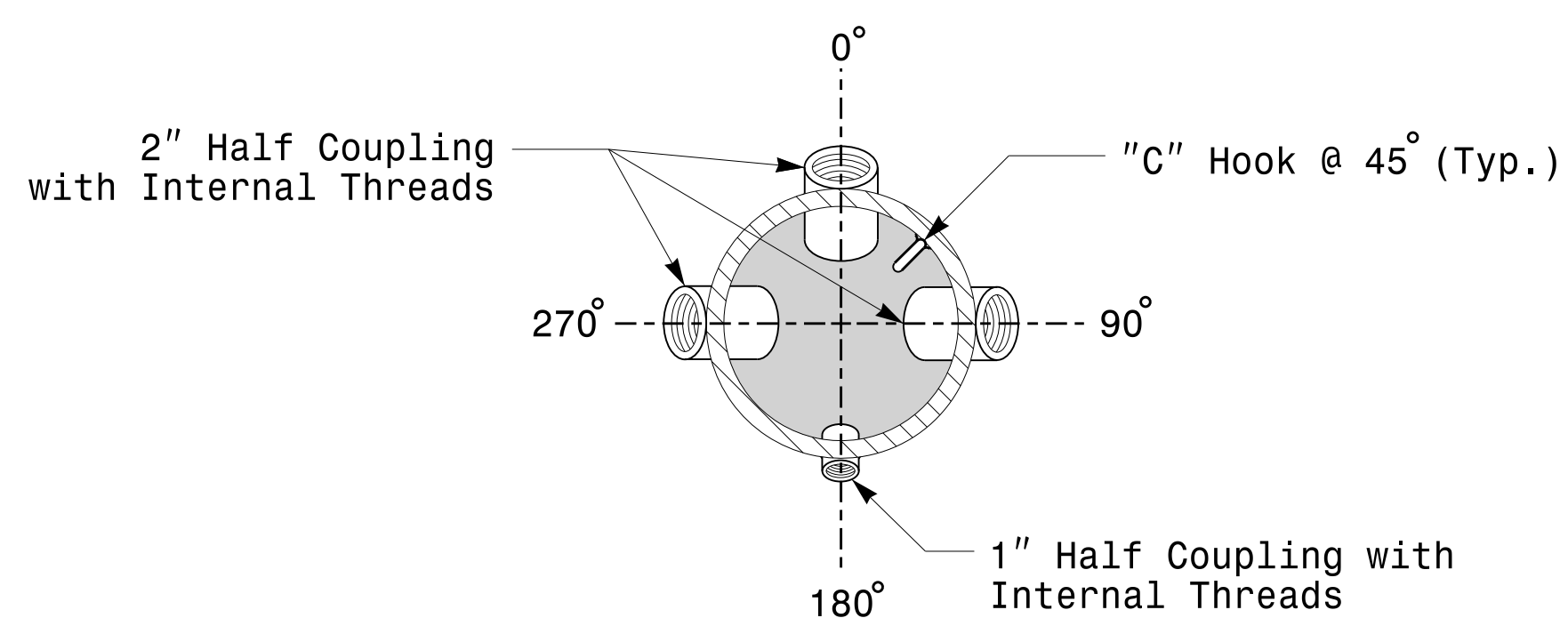
Note:
1. Opening in pole base plate shall be equal to pole base inside diameter minus 3 1/2" but shall not be less than 8 1/2".



Cable Entrances at Top of Pole

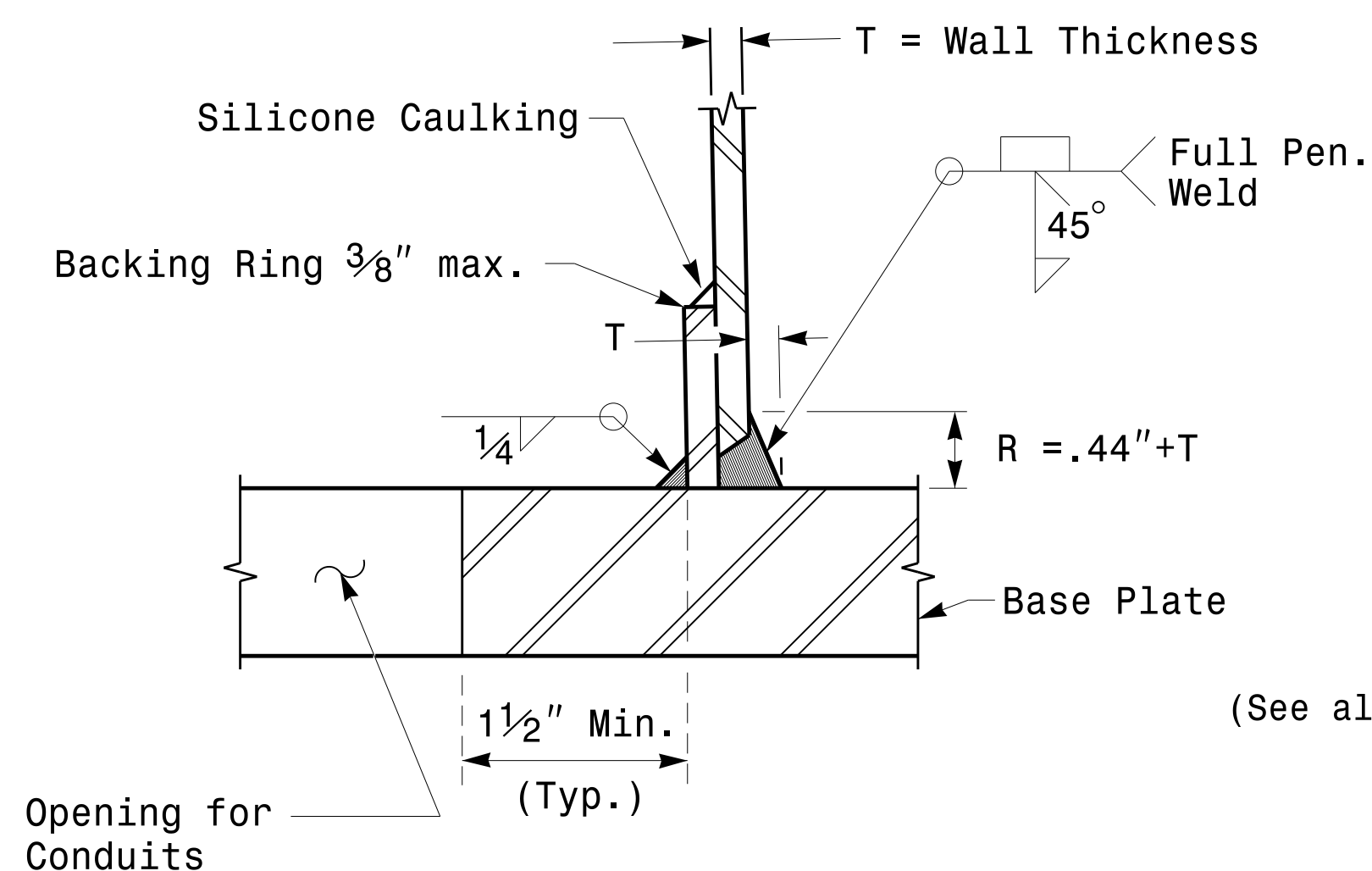


Section B-B
Pole Base Plate Details
(8 and 12 Bolt Pattern)



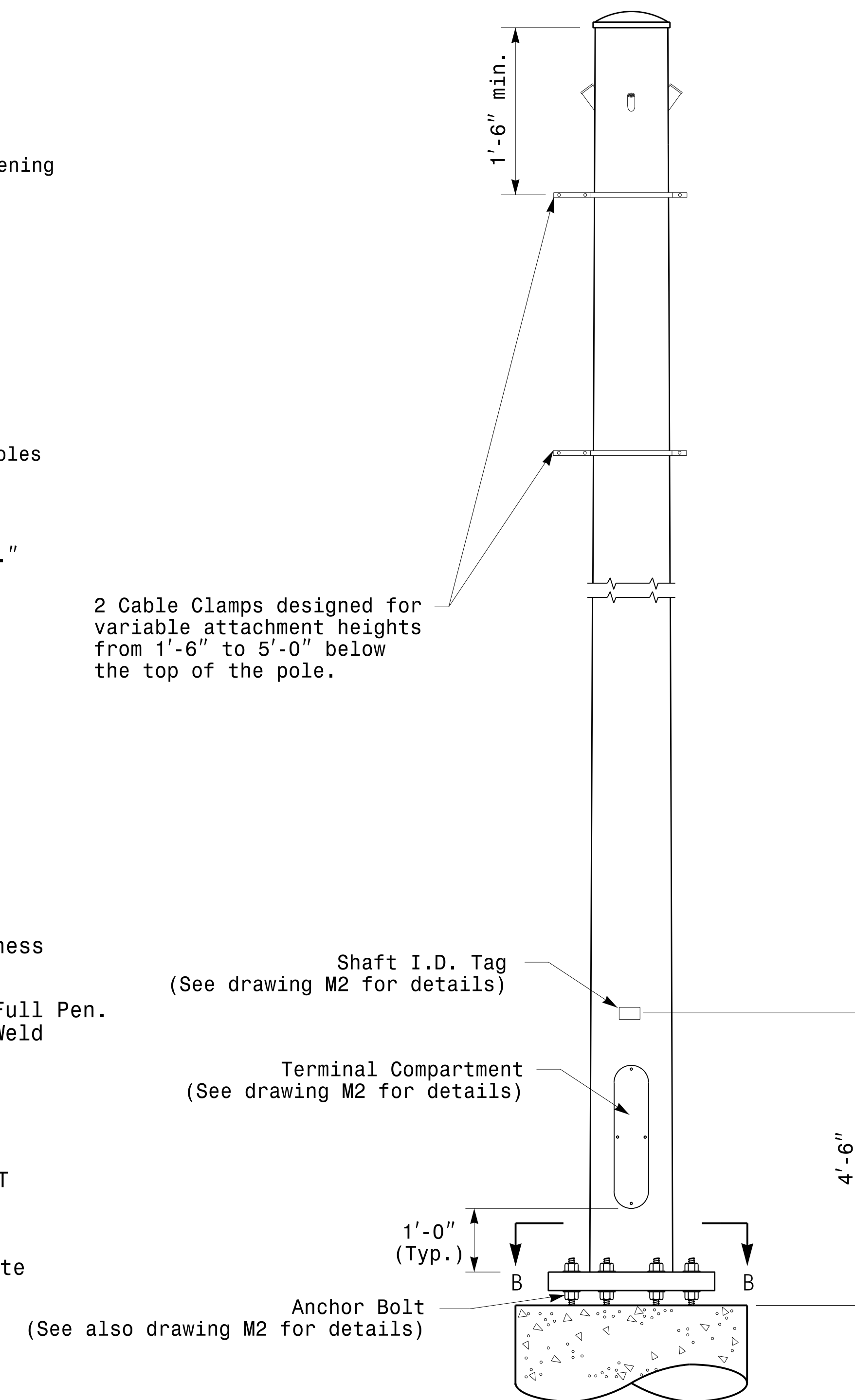
Section A-A

Radial Orientation for Factory Installed Accessories at Top of Pole



Section C-C
(Pole Attachment to Base Plate)
Full-Penetration Groove Weld Detail

2 Cable Clamps designed for variable attachment heights from 1'-6" to 5'-0" below the top of the pole.

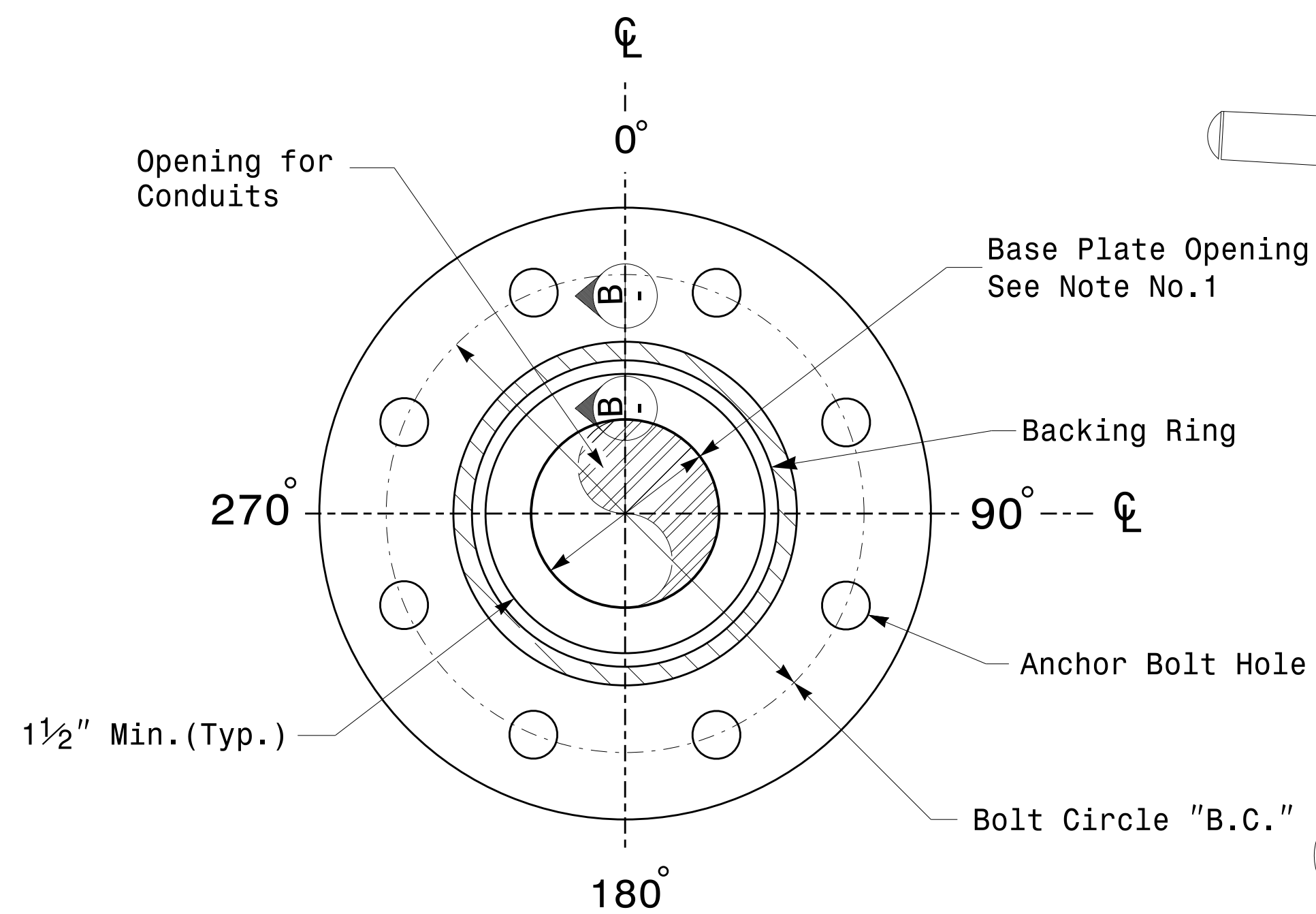


Monotube Strain Pole

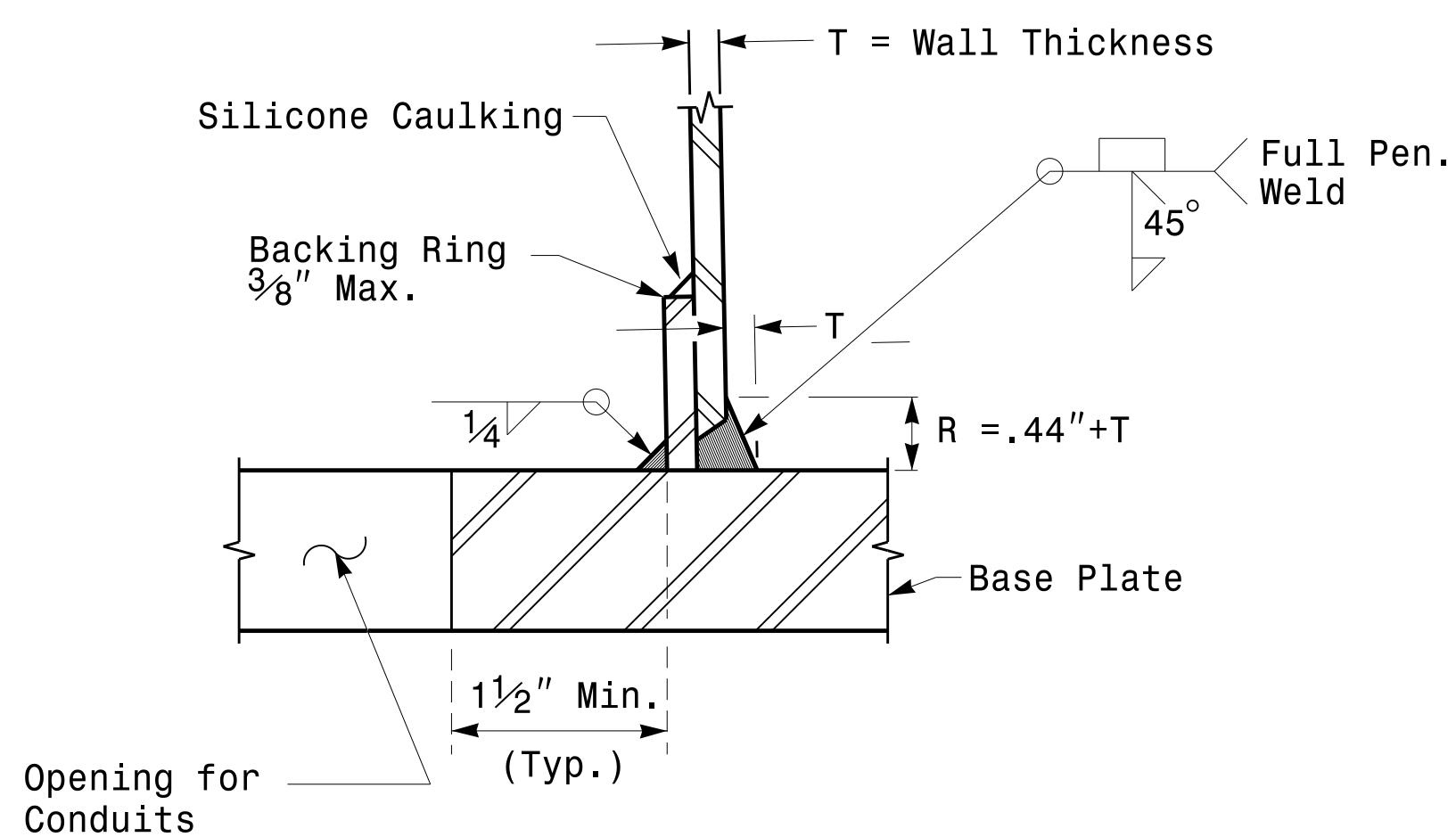
| | | | |
|---|--|--|---|
| <p>750 N. Greenfield Pkwy, Garner, NC 27529</p> | <p>Typical Fabrication Details For Strain Poles</p> | | <p>SEAL</p> <p>DocuSigned by Debesh C. Sarkar</p> |
| | <p>PLAN DATE: FEBRUARY 2016</p> <p>DESIGNED BY: K.C. DURIGON</p> | <p>PREPARED BY: N. BITTING</p> <p>REVIEWED BY: D.C. SARKAR</p> | |
| <p>SCALE: NONE</p> | <p>REVISIONS</p> | | <p>DATE</p> |

Fabrication Details – Strain Poles

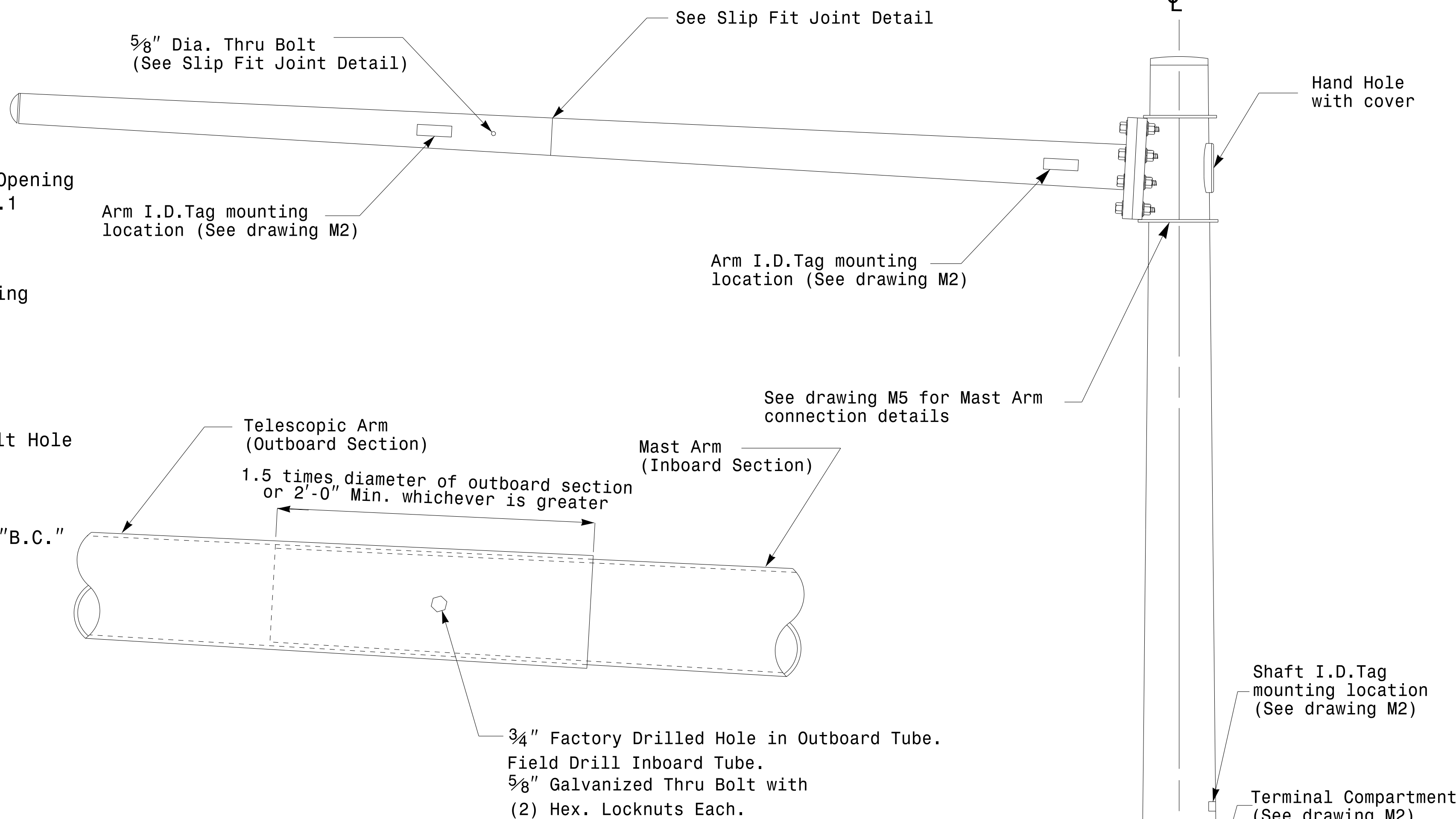
Note:
 1. Opening in pole base plate shall be equal to pole base inside diameter minus 3 1/2" but shall not be less than 8 1/2".



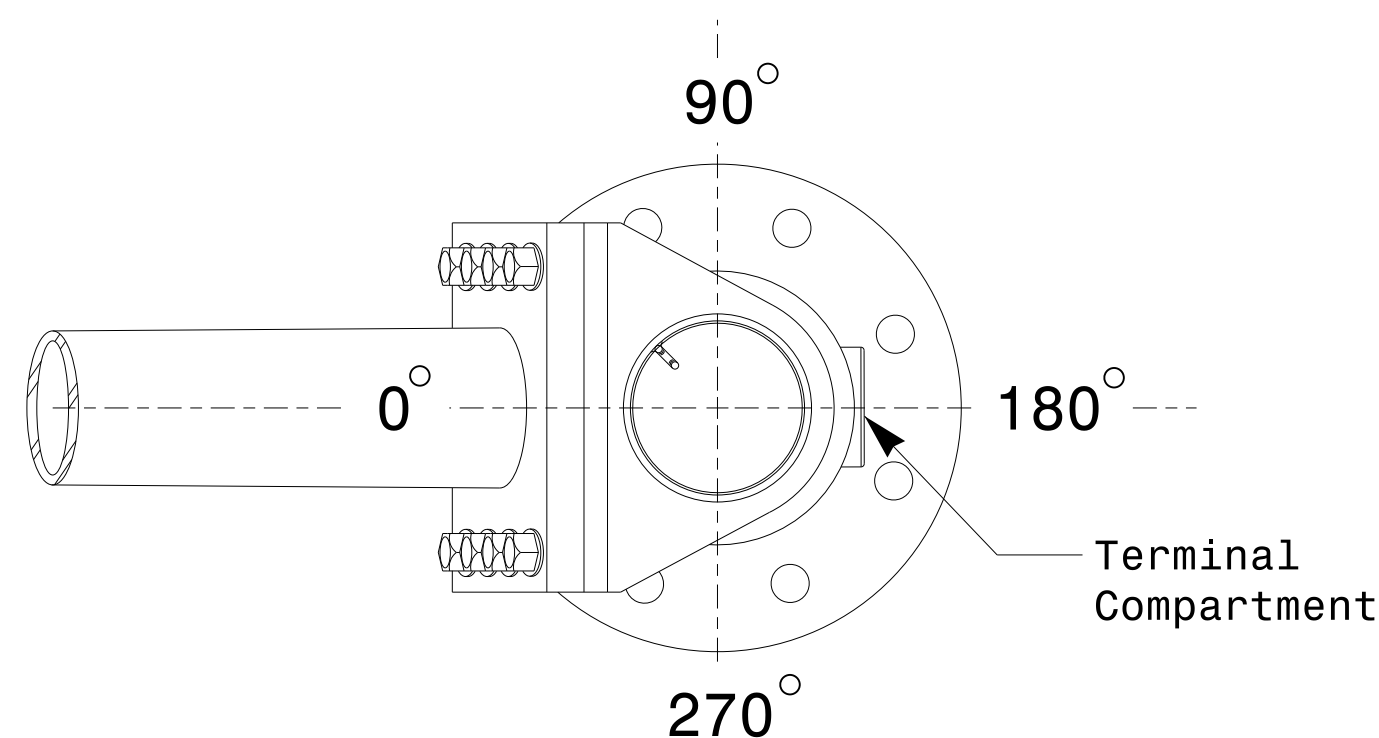
Section A-A
Pole Base Plate Details



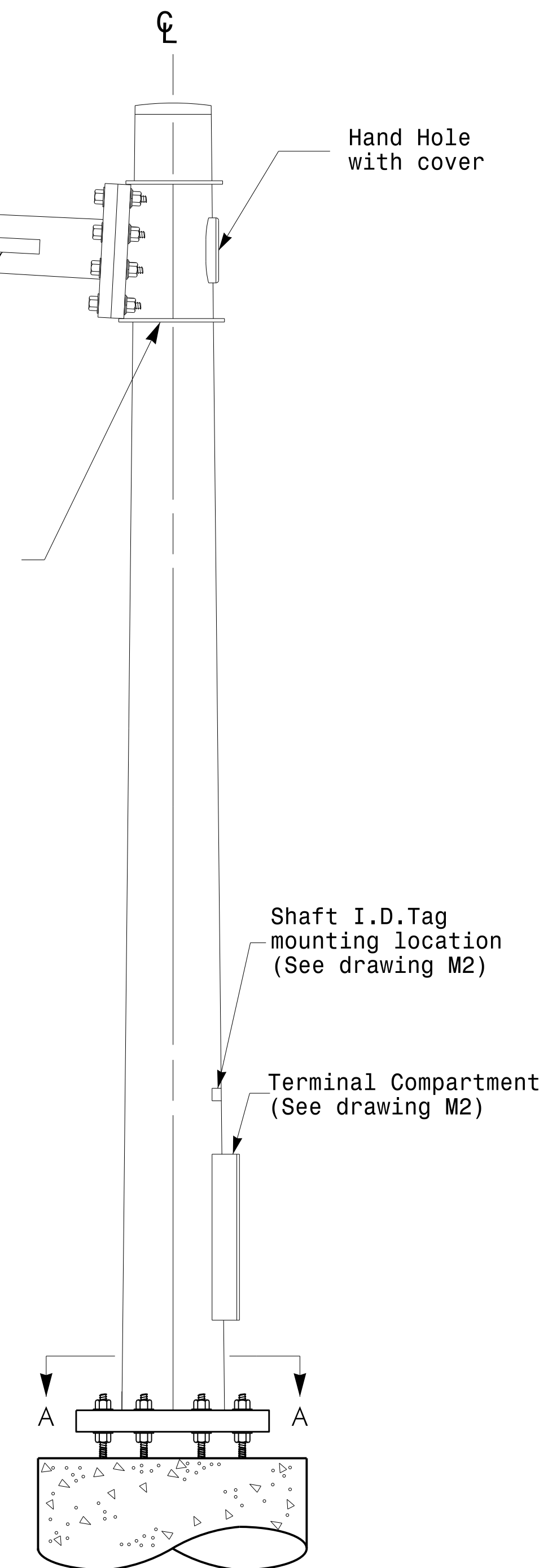
Section B-B
 (Pole Attachment to Base Plate)
Full-Penetration Groove Weld Detail



Slip Fit Joint Detail for Mast Arm



Mast Arm Radial Orientation



Mast Arm Pole

Fabrication Details – Mast Arm Poles

| | | | |
|-------------------------------------|--|---|----------------------------------|
| | Typical Fabrication Details For Mast Arm Poles | | SEAL D. C. SARKAR ENGINEER |
| | PLAN DATE: FEBRUARY 2016 PREPARED BY: N. BITTING | DESIGNED BY: K.C. DURIGON REVIEWED BY: D.C. SARKAR | |
| SCALE: 0 NA NONE | REVISIONS: | INIT.: | DATE: |
| DocuSigned by 44E8E32E147E4C4... | | | DATE: |

17-FEB-2016 16:05
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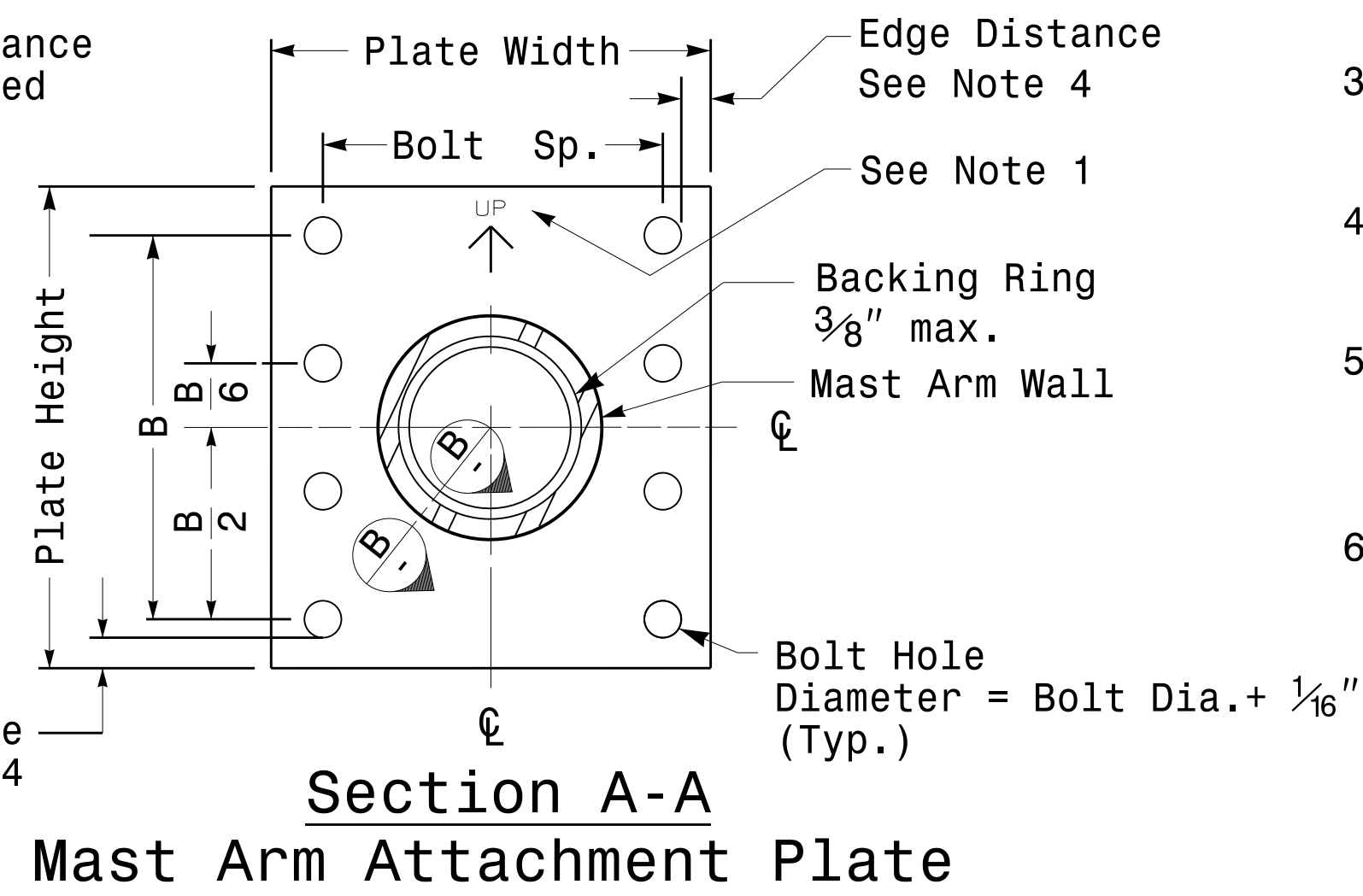
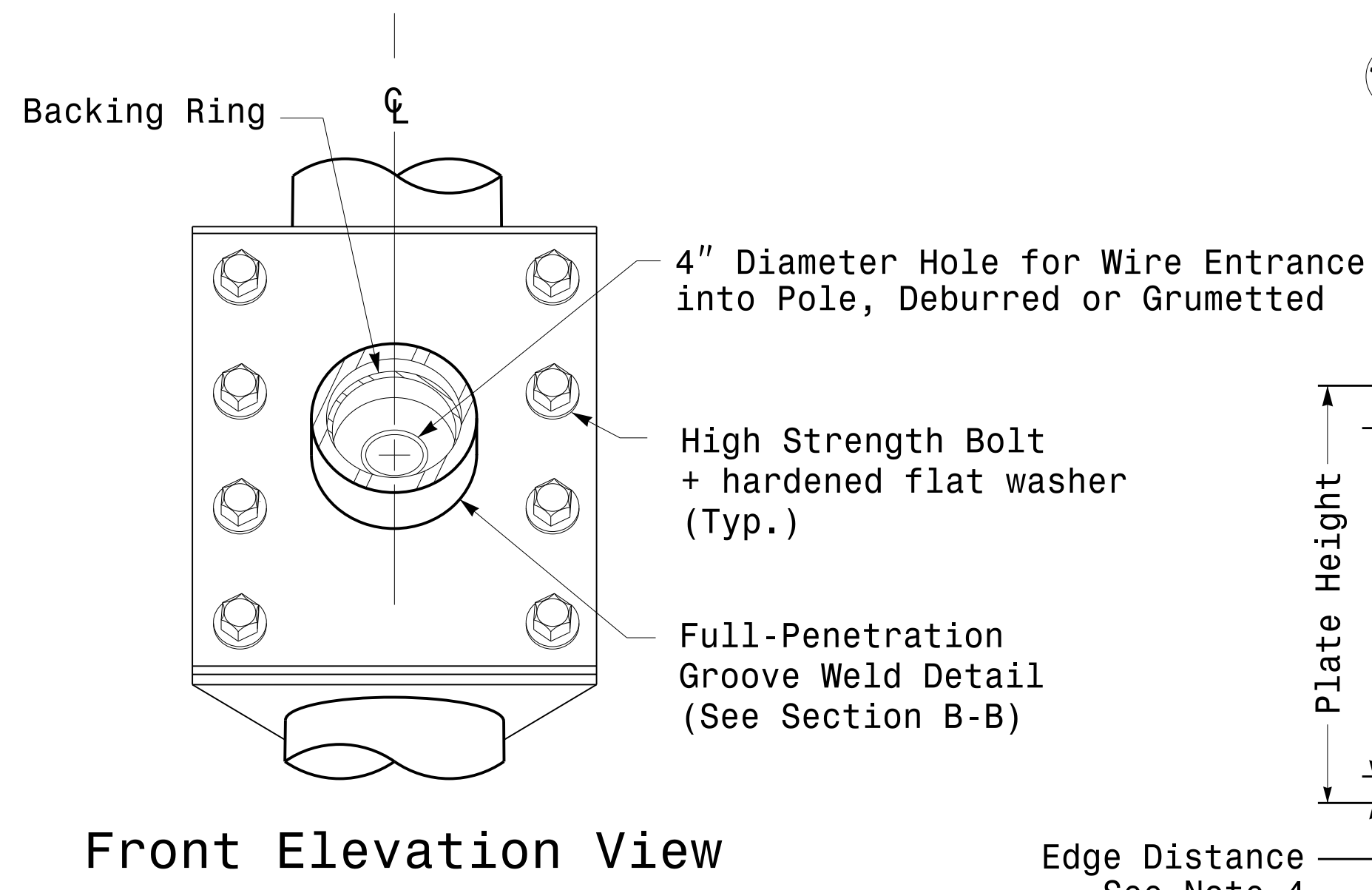
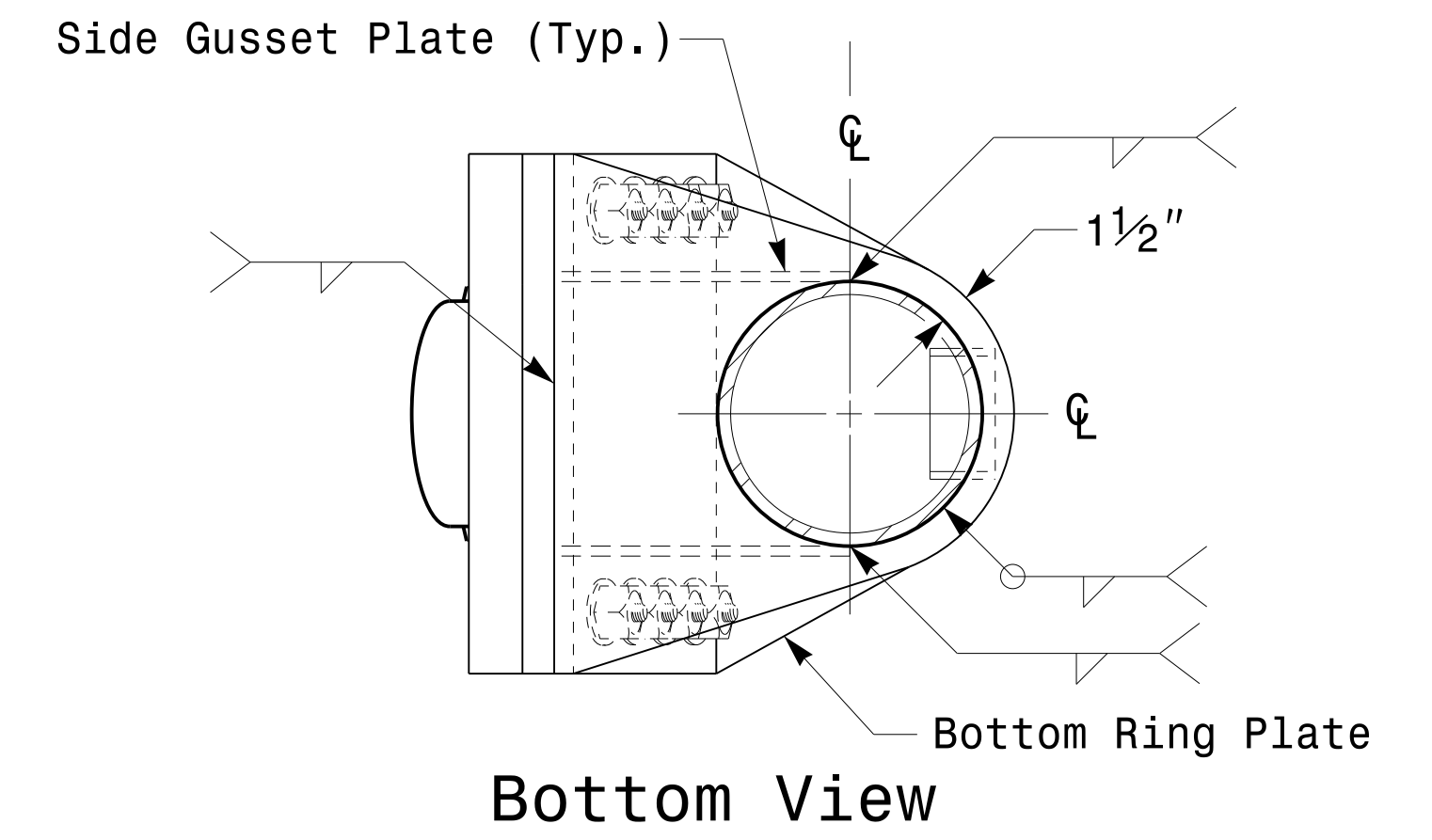
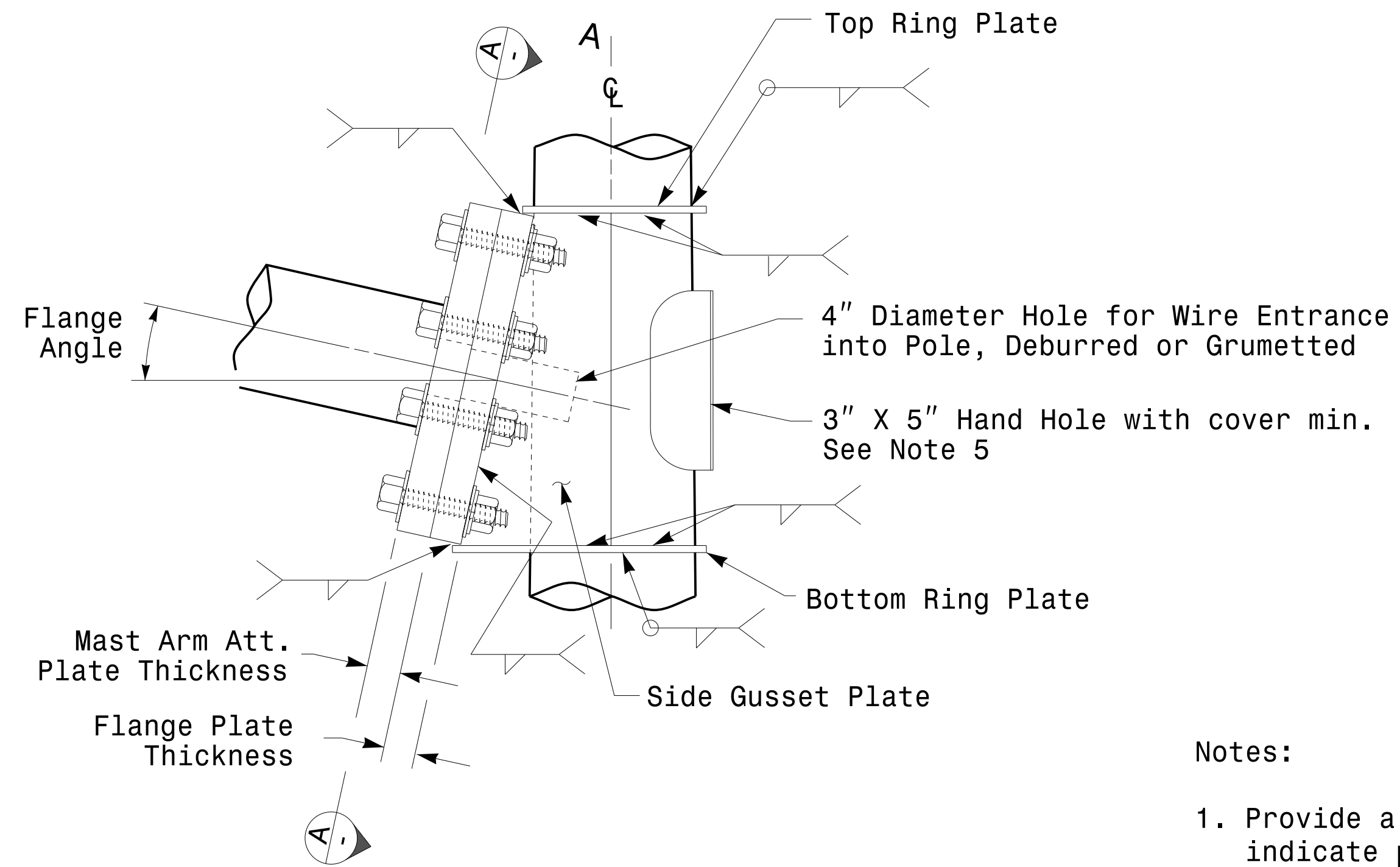
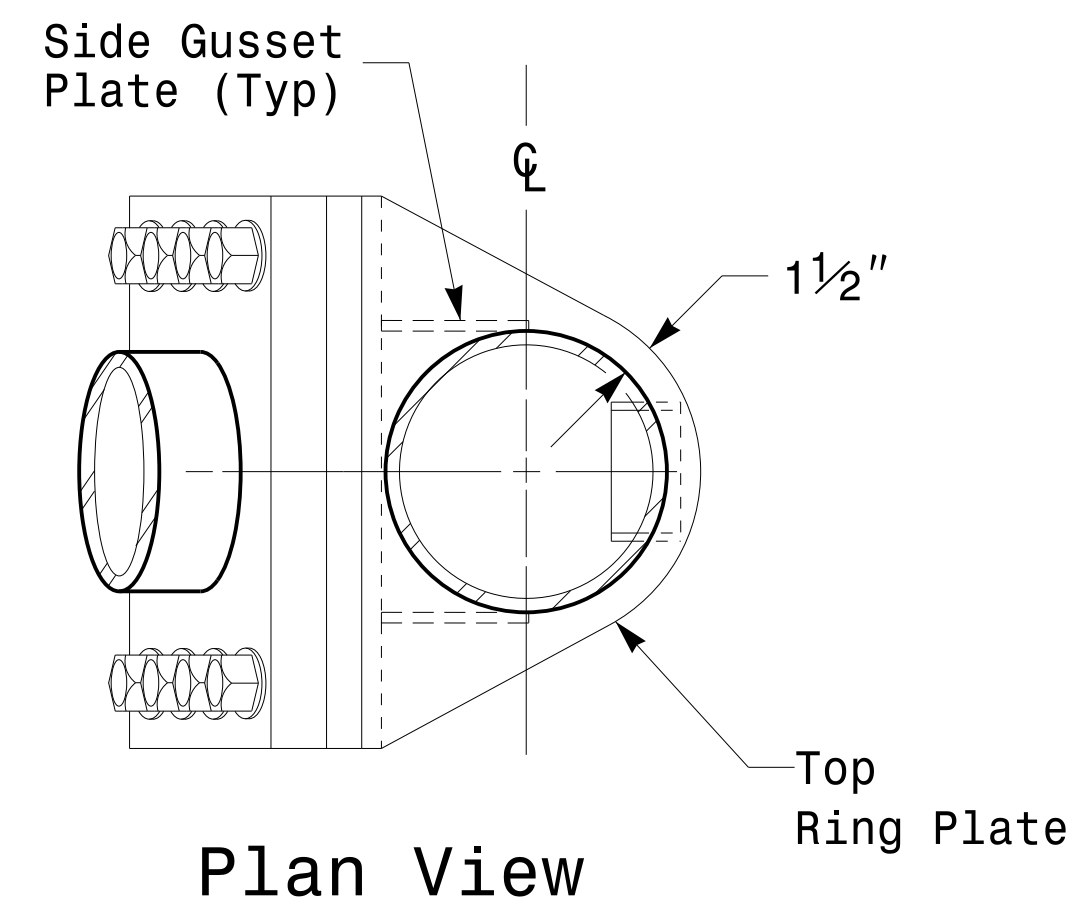
Welded Ring Stiffened Mast Arm Connection

PROJECT ID. NO.

SHEET NO.

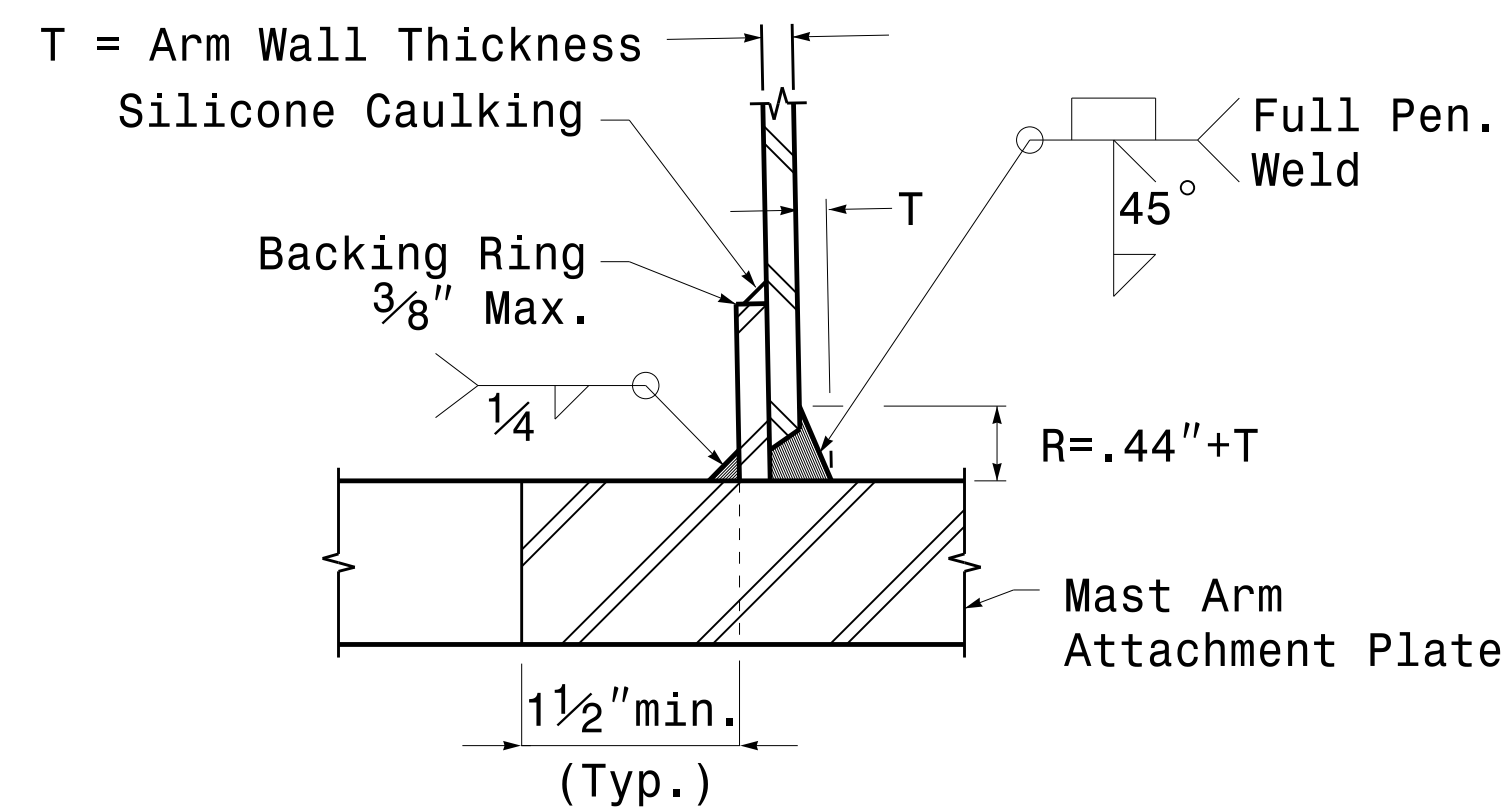
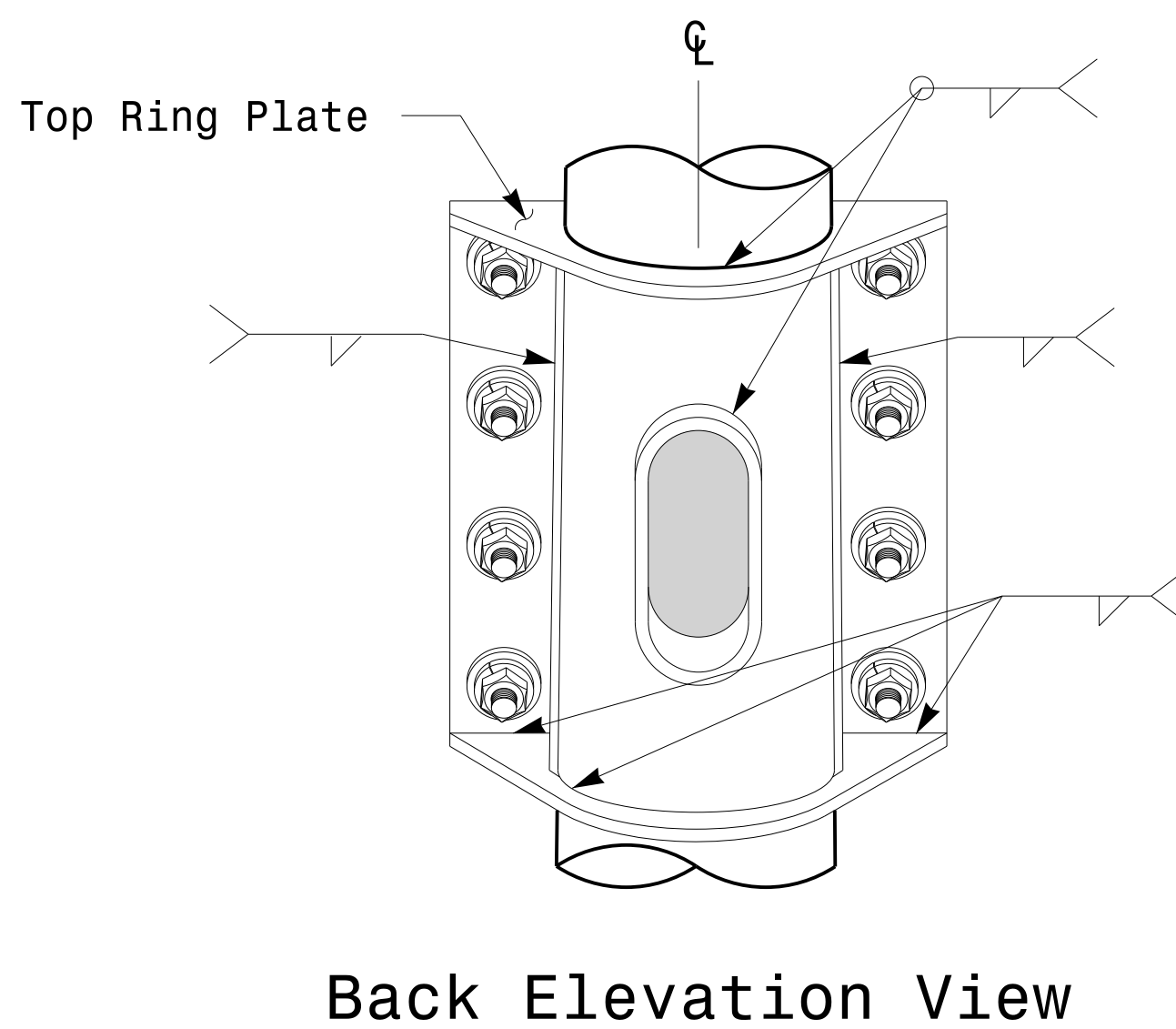
I-5000

Sig.M5



Notes:

1. Provide a permanent means of identification above the mast arm to indicate proper attachment orientation of the mast arm.
2. Designer will determine the size of all structural components, plates, fasteners, and welds shown unless they are already specified.
3. Fabricator is responsible for providing appropriate holes at drainage points to drain galvanizing materials.
4. For minimum edge distance follow AISC Table J3.4 and J3.5. For nominal bolt hole size use Table J3.3.
5. Provide upper handhole as necessary when shaft extensions are required for luminaire arms or camera. For poles without luminaires/camera, wiring can be done through the top of pole.
6. Allowable range of flange tilt angle will vary from 0° to as required.



Prepared in the Offices of:

750 N. Greenfield Pkwy, Garner, NC 27529

SCALE: 0 NA NONE

Typical Fabrication Details For Mast Arm Connection To Pole

| | |
|--------------------------|---------------------------|
| PLAN DATE: FEBRUARY 2016 | DESIGNED BY: C.F. ANDREWS |
| PREPARED BY: N. BITTING | REVIEWED BY: D.C. SARKAR |
| REVISIONS | INIT. DATE |
| | |
| | |
| | |

SEAL

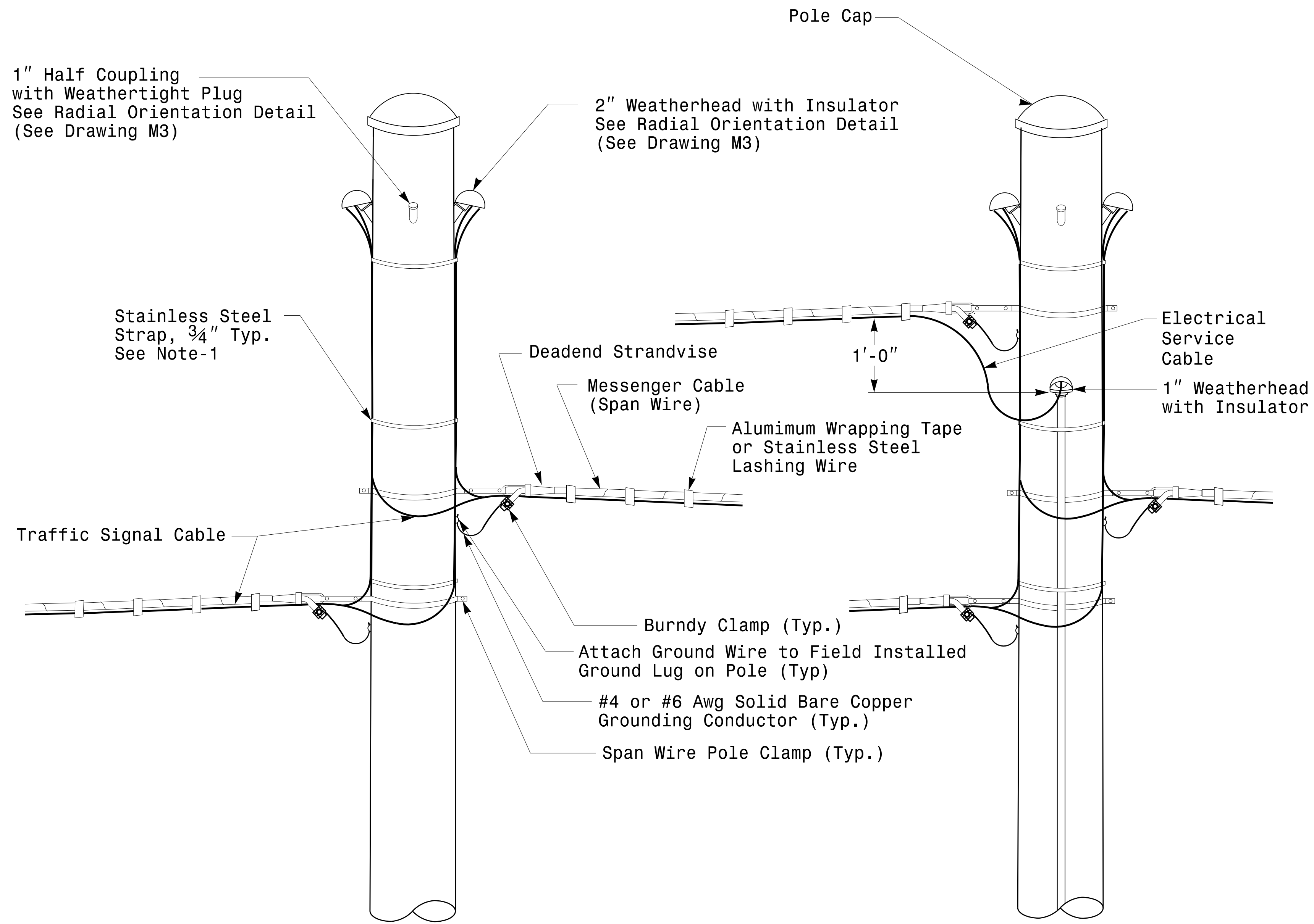
DocuSigned by: Debesh C. Sarkar

2/17/2016

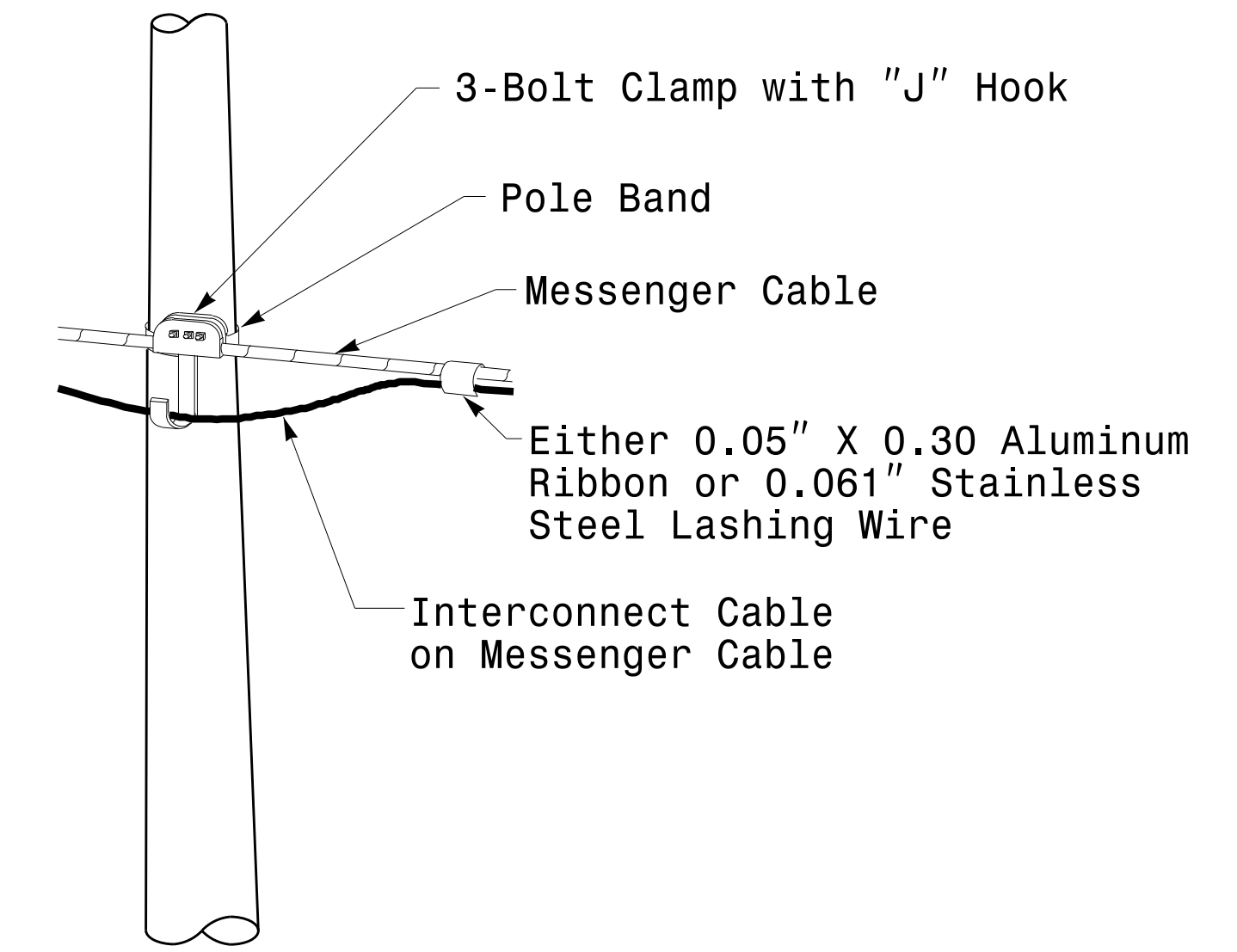
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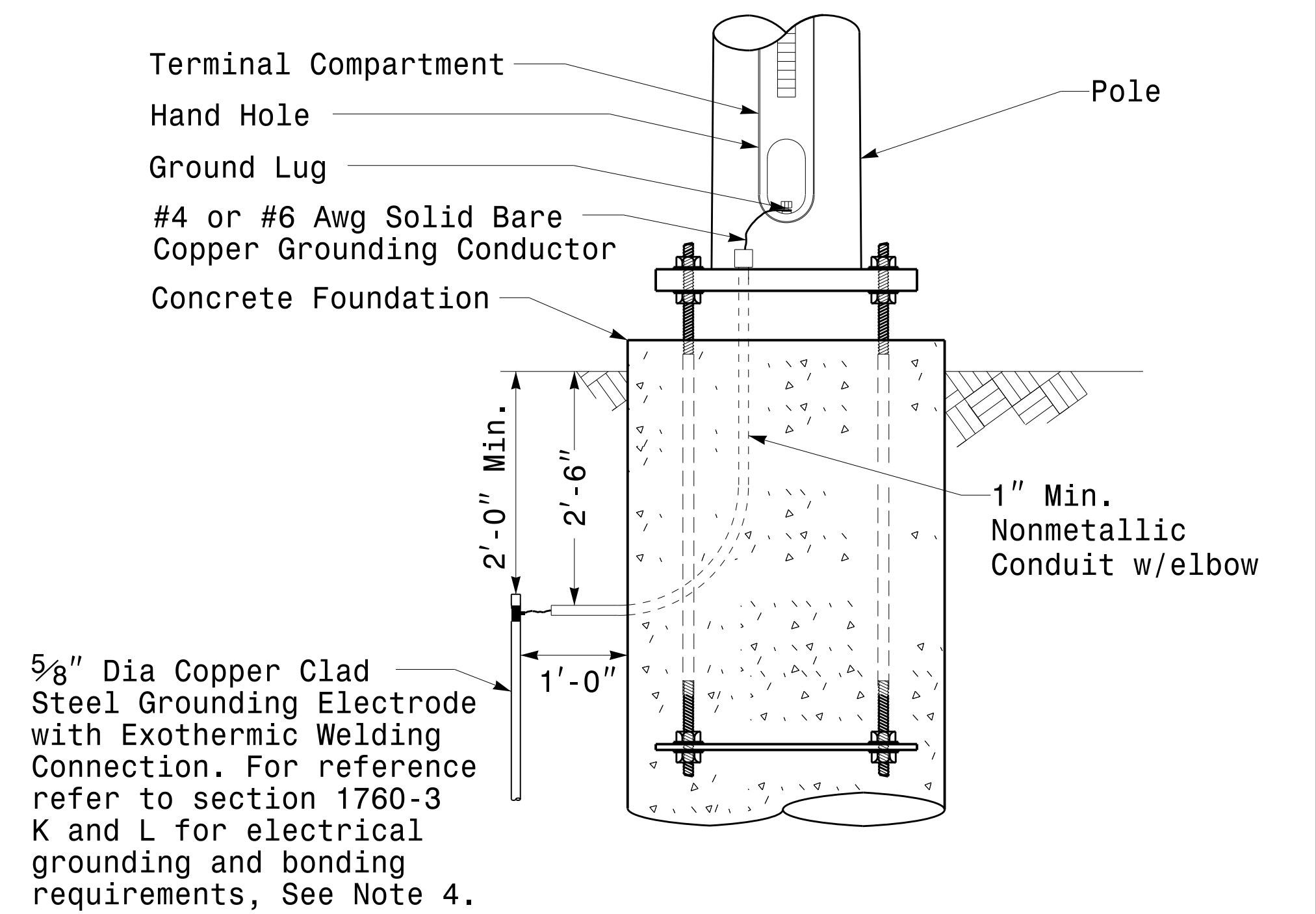
Fabrication Details - Mast Arm Connection



Strain Pole Attachments



Attachment of Cable to Intermediate Metal Pole



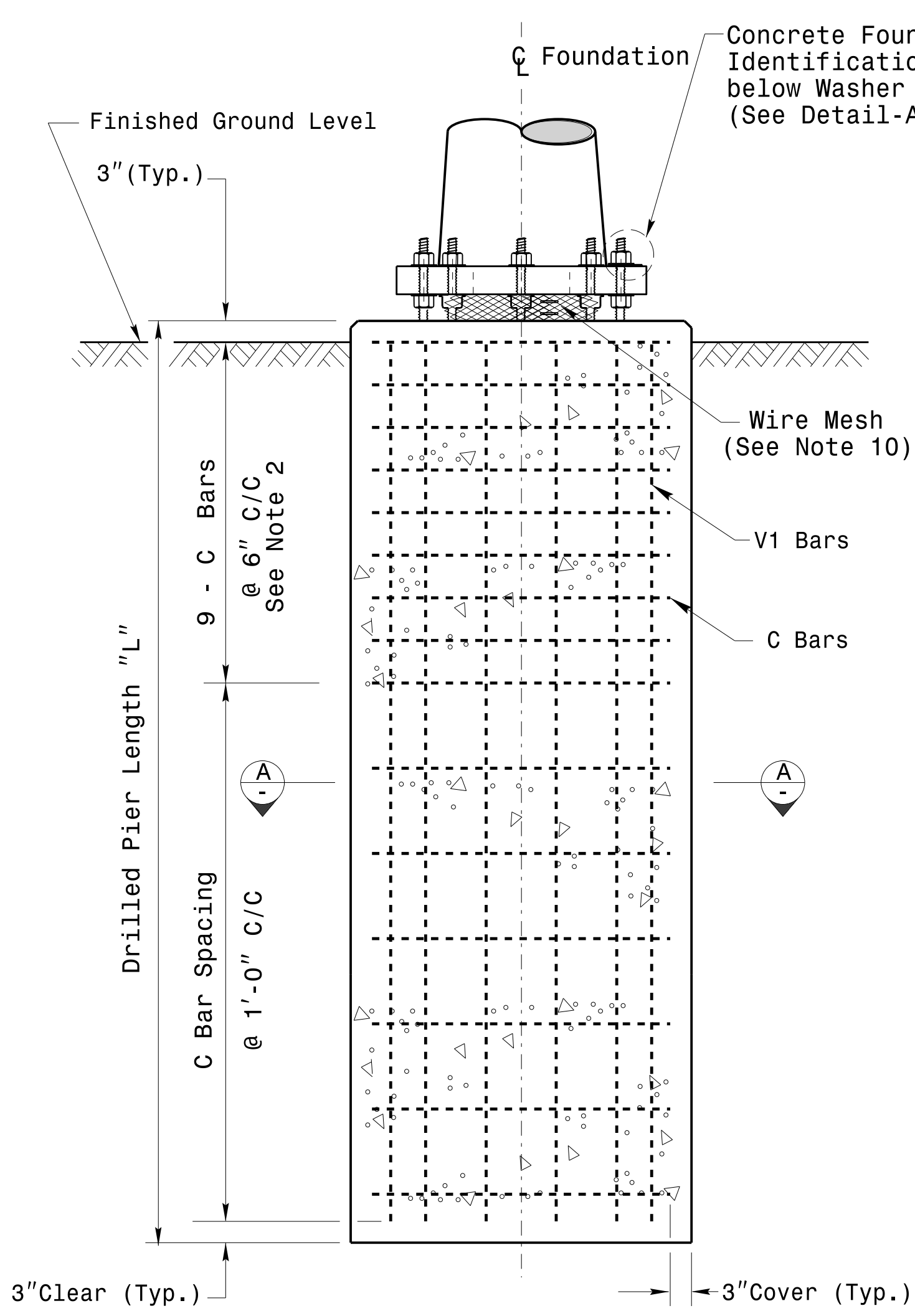
Metal Pole Grounding Detail For Strain Pole and Mast Arm

NOTE:

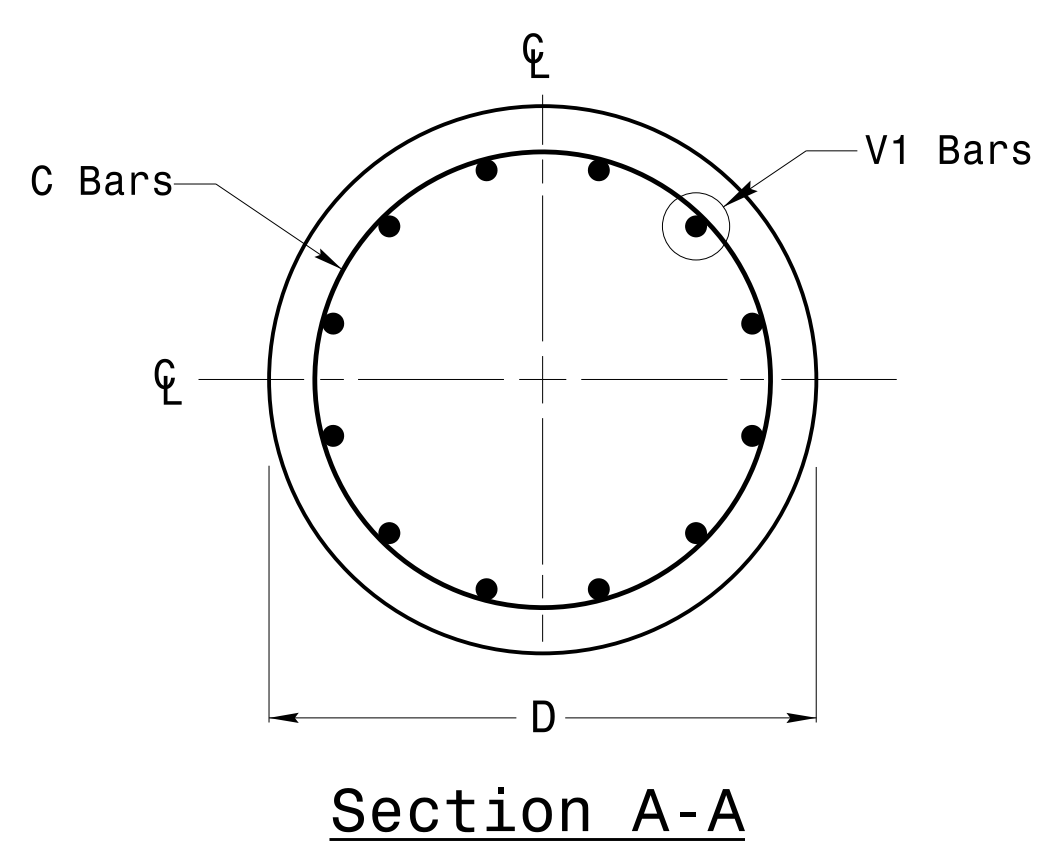
1. Strap all signal cables to the side of the pole with 3/4" stainless steel straps when the distance between the spanwire attachment clamp and the weatherheads exceeds 3'-0".
2. Provide minimum two spanwire pole clamps per pole.
3. It is prohibited to attach two span wires at one pole clamp.
4. For general requirements refer to NCDOT Standard Specifications for Roadway and Structures, January 2012.

| | | | | |
|---|--|----------------------------------|--|------------------------|
| <p>750 N. Greenfield Pkwy, Garner, NC 27529</p> | <p>Typical Fabrication Details For Strain Pole Attachments</p> | | <p>SEAL</p> <p>DocuSigned By: Debesh C. Sarkar</p> <p>44E8E32E147E4C4...</p> | |
| | <p>PLAN DATE: FEBRUARY 2016</p> | <p>DESIGNED BY: C.F. ANDREWS</p> | | <p>DATE: 2/17/2016</p> |
| | <p>PREPARED BY: N. BITTING</p> | <p>REVIEWED BY: D.C. SARKAR</p> | | <p>DATE:</p> |

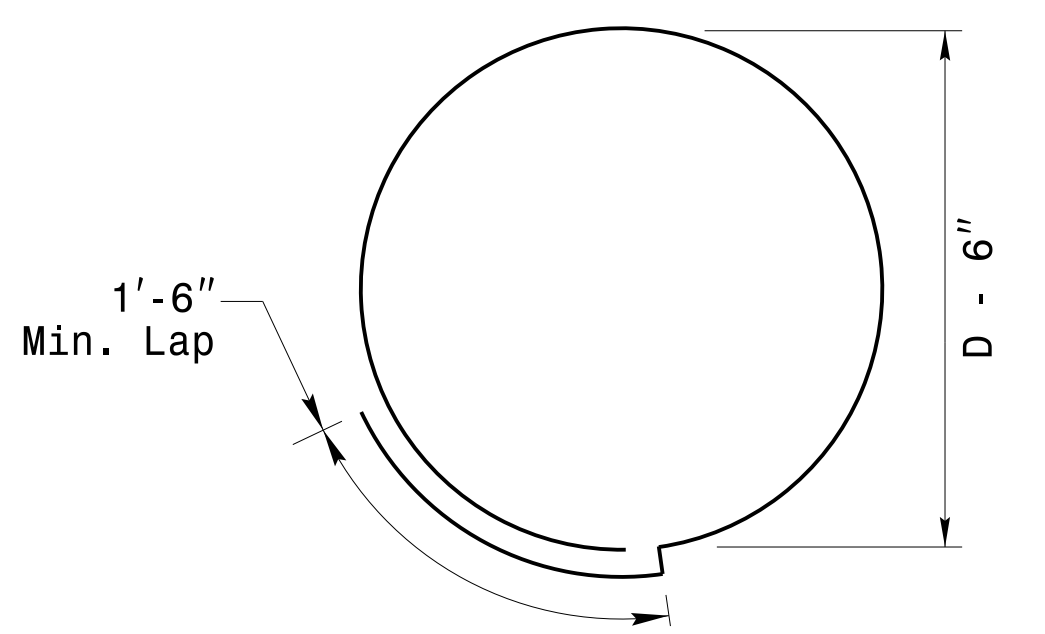
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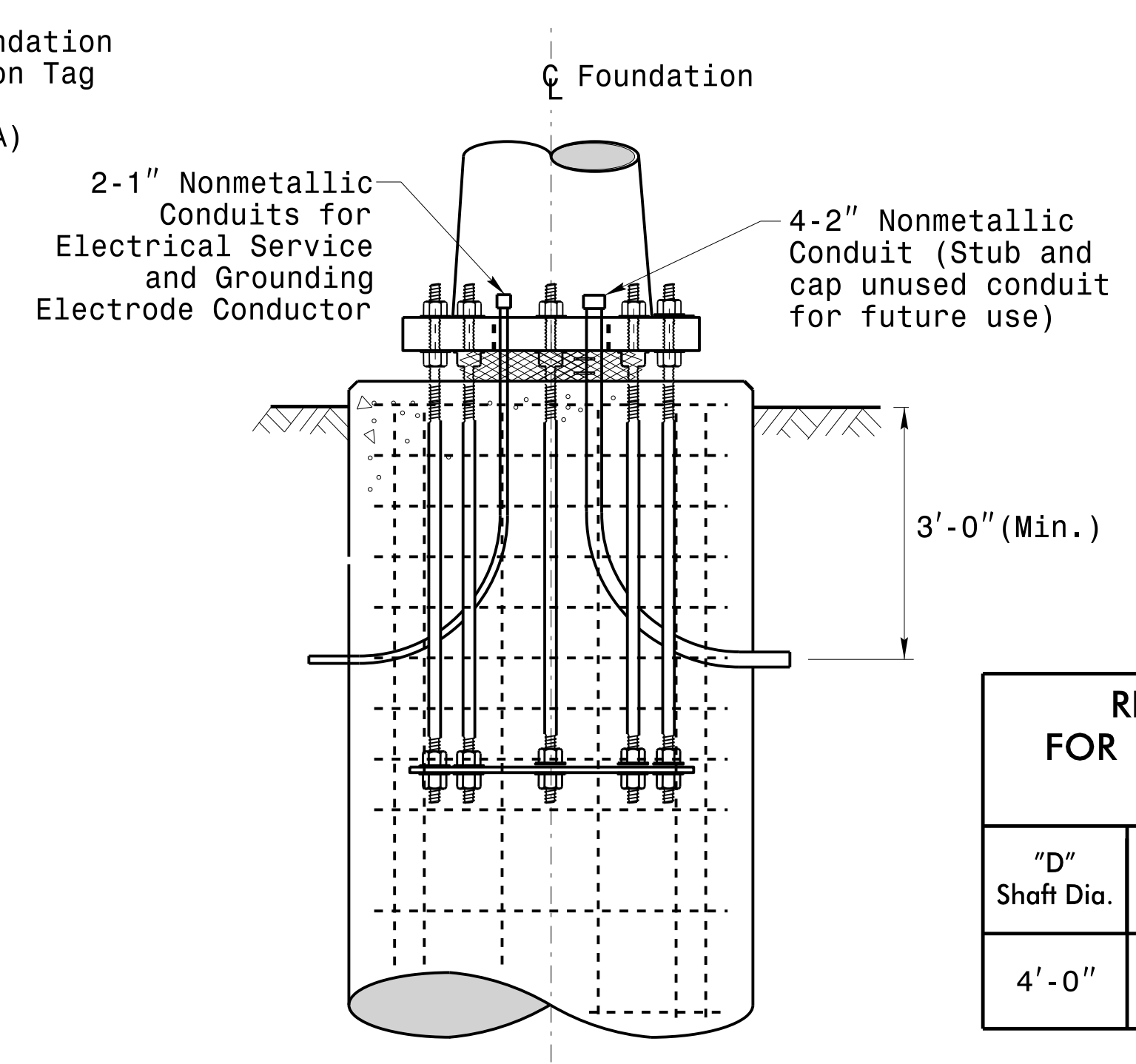
Concrete Shaft Elevation



Section A-A



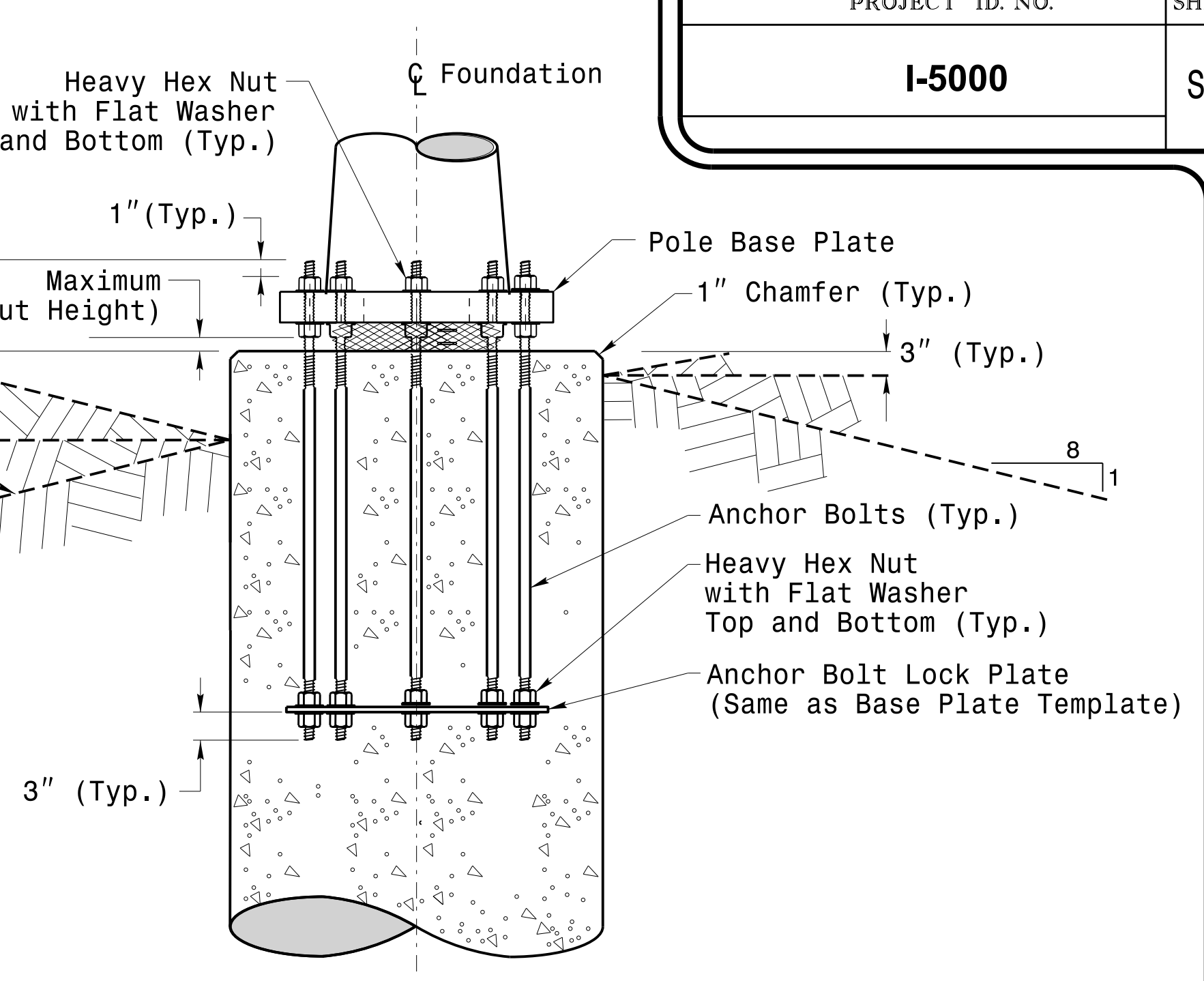
Typical "C" Bar Detail



Typical Foundation Conduit Details

| "D" Shaft Dia. | Conc. Volume (cu. yds.) | Bar Name | MIN. | Size | Type | Length |
|----------------|-------------------------|----------|------|------|------|--------|
| 4'-0" | .465 x L | V1 | - | #8 | STR. | ** |
| | | C | * | #4 | CIR. | 12'-6" |

* See Note No. 2
 ** See Note No. 3

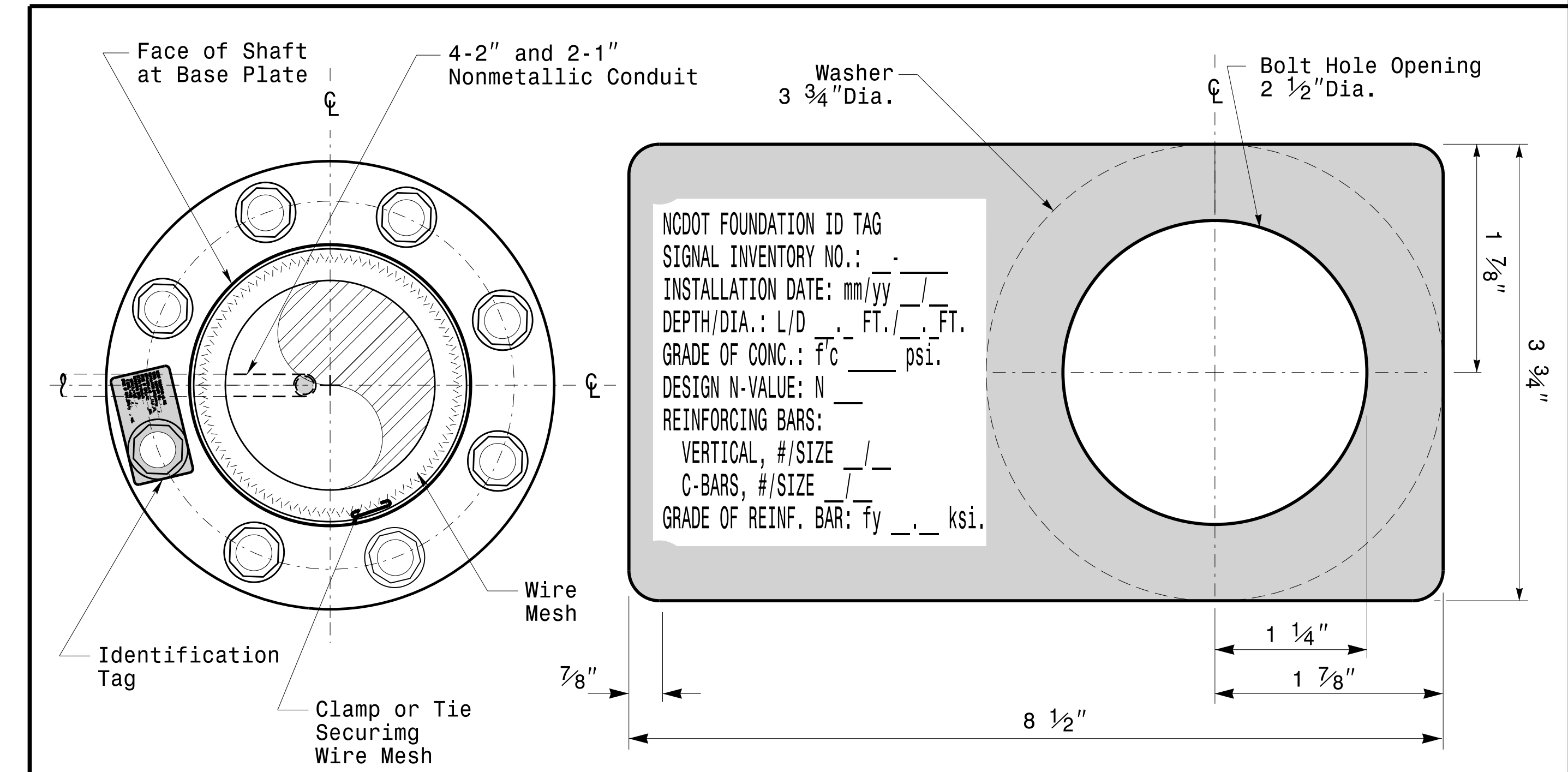


Typical Foundation Anchor Bolt Details

(Reinforcing Cage Not Shown for Clarity)

General Notes:

1. If actual subsurface conditions differ significantly from boring data contact the Engineer before excavating or placing concrete.
2. Circular tie reinforcing rings may be vertically adjusted by +/-3" at a depth between 2'-0" and 3'-0" to facilitate the installation of electrical conduit entering in the cage.
3. For standard foundations, see sheet Sig. M8 for details. Vertical reinforcing bars (V1) may be horizontally adjusted by +/-3" to facilitate the installation of electrical conduit entering into the cage.
4. Provide 2" to 5" foundation projection above ground level depending on the ground slope.
5. Unless otherwise shown, foundation designs are based on non-sloping level ground surfaces with slope ratios of 8:1 (H:V) or flatter. If actual ground line slopes are steeper contact the Engineer before excavating or placing concrete.
6. Construct foundations in accordance with NCDOT Standard Provisions SP09 R005- Foundations and Anchor Rod Assemblies for Metal Poles. All applicable 2012 NCDOT Standard Specifications are referenced in this provision. Refer to the NCDOT Resources/Specifications page located on the Connect NCDOT website.
[https://connect.ncdot.gov/resources/Specifications and Special Provisions.aspx](https://connect.ncdot.gov/resources/Specifications%20and%20Special%20Provisions.aspx)
7. Use air entrained AA concrete mix with a compression strength of f'c=4500 psi.(min.) after 28 days.
8. Use ASTM A615 grade 60 deformed bars for all reinforcing steel. Maintain at least 3" cover on all reinforcement.
9. Locate the Identification Tag on the top of the base plate, directly above the conduit's entry point.
10. Provide two layers of galvanized welded 23 gauge (0.25) 6" wide 4 mesh wire around pipes under the base plate and secure it with ties if necessary.
11. Preferred location for the I.D. Tag is as shown in Detail-A; directly above the conduit entering the foundation.



Concrete Foundation Identification Tag Details

Detail-A

D = Diameter
 L = Length/Depth
 mm = Month
 yy = Year

| | | | |
|-------------|--|---|--------------------------------------|
| | Construction Details For Foundations | | |
| | PLAN DATE: FEBRUARY 2016 PREPARED BY: N. BITTING | DESIGNED BY: C.B. COGDILL REVIEWED BY: D.C. SARKAR | |
| SCALE: NONE | REV. NO. 1 COMMENTS: Revised Foundation Top Details | INIT. N.B. DATE: 5/11/2015 | DocuSigned by DATE: 2/17/2016 |

17-FEB-2016 16:11:03
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 3:01:00

Construction Details - Foundations

SOIL CONDITION

| | |
|-----------------|-----------|
| PROJECT ID. NO. | SHEET NO. |
| I-5000 | Sig.M8 |

| | | STANDARD STRAIN POLES | | | | | STANDARD FOUNDATIONS 48" Diameter Drilled Pier Length (L) - Feet | | | | | | | Reinforcement | | | | |
|-------------|-------|-----------------------|-------------------|---------------------|----------------------------|-------------|---|--------------------|--------------------|--------------------------|------------------|--------------------|----------------------|-------------------|--------------|----------------|--------------|---------------|
| | | Case No. | Pole Height (Ft.) | Base Plate BC (In.) | Reactions at the Pole Base | | | Clay | | | | Sand | | | Longitudinal | | Stirrups | |
| | | | | | Axial (kip) | Shear (kip) | Moment (ft-kip) | Medium N-Value 4-8 | Stiff N-Value 9-15 | Very Stiff N-Value 16-30 | Hard N-Value >30 | Loose N-Value 4-10 | Medium N-Value 11-30 | Dense N-Value >30 | Bar Size (#) | Quantity (ea.) | Bar Size (#) | Spacing (in.) |
| WIND ZONE 1 | LIGHT | S26L3 | 26 | 25 | 2 | 11 | 270 | 19 | 13 | 10 | 8 | 17 | 14.5 | 12.5 | 8 | 12 | 4 | 12 |
| | | S30L3 | 30 | 25 | 2 | 11 | 300 | 19.5 | 13.5 | 10 | 8 | 17.5 | 15 | 13 | 8 | 14 | 4 | 12 |
| | | S35L3 | 35 | 25 | 3 | 11 | 320 | 20 | 13.5 | 10.5 | 8 | 17.5 | 15 | 13 | 8 | 14 | 4 | 12 |
| | HEAVY | S30H3 | 30 | 29 | 3 | 16 | 450 | 24.5 | 16 | 12 | 9 | 21 | 17.5 | 15 | 8 | 16 | 4 | 6 |
| | | S35H3 | 35 | 29 | 4 | 16 | 515 | 26 | 17 | 12.5 | 9.5 | 22 | 18.5 | 16 | 8 | 16 | 4 | 6 |
| WIND ZONE 2 | LIGHT | S26L2 | 26 | 23 | 2 | 10 | 245 | 18 | 12.5 | 9.5 | 8 | 16.5 | 14 | 12 | 8 | 12 | 4 | 12 |
| | | S30L2 | 30 | 23 | 2 | 10 | 270 | 18.5 | 12.5 | 10 | 8 | 16.5 | 14 | 12.5 | 8 | 12 | 4 | 12 |
| | | S35L2 | 35 | 23 | 3 | 10 | 300 | 19.5 | 13 | 10 | 8 | 17 | 14.5 | 13 | 8 | 12 | 4 | 12 |
| | HEAVY | S30H2 | 30 | 29 | 3 | 15 | 415 | 23 | 15.5 | 11.5 | 9 | 20 | 17 | 14.5 | 8 | 16 | 4 | 6 |
| | | S35H2 | 35 | 29 | 4 | 15 | 475 | 25 | 16.5 | 12 | 9.5 | 21 | 17.5 | 15.5 | 8 | 16 | 4 | 6 |
| WIND ZONE 3 | LIGHT | S26L2 | 26 | 23 | 2 | 10 | 245 | 18 | 12.5 | 9.5 | 8 | 16.5 | 14 | 12 | 8 | 12 | 4 | 12 |
| | | S30L2 | 30 | 23 | 2 | 10 | 270 | 18.5 | 12.5 | 10 | 8 | 16.5 | 14 | 12.5 | 8 | 12 | 4 | 12 |
| | | S35L2 | 35 | 23 | 3 | 10 | 300 | 19.5 | 13 | 10 | 8 | 17 | 14.5 | 13 | 8 | 12 | 4 | 12 |
| | HEAVY | S30H2 | 30 | 29 | 3 | 15 | 415 | 23 | 15.5 | 11.5 | 9 | 20 | 17 | 14.5 | 8 | 16 | 4 | 6 |
| | | S35H2 | 35 | 29 | 4 | 15 | 475 | 25 | 16.5 | 12 | 9.5 | 21 | 17.5 | 15.5 | 8 | 16 | 4 | 6 |
| WIND ZONE 4 | LIGHT | S26L1 | 26 | 22 | 2 | 8 | 190 | 16 | 11.5 | 8.5 | 8 | 15 | 12.5 | 11 | 8 | 12 | 4 | 12 |
| | | S30L1 | 30 | 22 | 2 | 8 | 205 | 16.5 | 11.5 | 9 | 8 | 15 | 13 | 11.5 | 8 | 12 | 4 | 12 |
| | | S35L1 | 35 | 22 | 3 | 8 | 230 | 17 | 12 | 9 | 8 | 15.5 | 13.5 | 11.5 | 8 | 12 | 4 | 12 |
| | HEAVY | S30H1 | 30 | 25 | 3 | 12 | 320 | 20.5 | 13.5 | 10.5 | 8 | 18 | 15 | 13.5 | 8 | 16 | 4 | 6 |
| | | S35H1 | 35 | 25 | 4 | 12 | 350 | 21 | 14 | 10.5 | 8.5 | 18.5 | 15.5 | 13.5 | 8 | 16 | 4 | 6 |
| WIND ZONE 5 | LIGHT | S26L2 | 26 | 23 | 2 | 10 | 245 | 18 | 12.5 | 9.5 | 8 | 16.5 | 14 | 12 | 8 | 12 | 4 | 12 |
| | | S30L2 | 30 | 23 | 2 | 10 | 270 | 18.5 | 12.5 | 10 | 8 | 16.5 | 14 | 12.5 | 8 | 12 | 4 | 12 |
| | | S35L2 | 35 | 23 | 3 | 10 | 300 | 19.5 | 13 | 10 | 8 | 17 | 14.5 | 13 | 8 | 12 | 4 | 12 |
| | HEAVY | S30H2 | 30 | 29 | 3 | 15 | 415 | 23 | 15.5 | 11.5 | 9 | 20 | 17 | 14.5 | 8 | 16 | 4 | 6 |
| | | S35H2 | 35 | 29 | 4 | 15 | 475 | 25 | 16.5 | 12 | 9.5 | 21 | 17.5 | 15.5 | 8 | 16 | 4 | 6 |

General Notes:

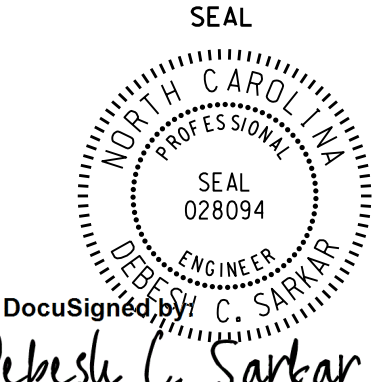
1. Values shown in the "Reactions at the Pole Base" column represent the minimum acceptable capacity allowed for design using a design CSR of 1.00.
2. Use chairs and spacers to maintain proper clearance.
3. For foundation, always use air-entrain concrete mix.

Foundation Selection:

1. Perform a standard penetration test at each proposed foundation site to determine "N" value.
2. Select the appropriate wind zone from M 1 drawing.
3. Select the soil type (Clay or Sand) that best describes the soil characteristics.
4. Get the appropriate standard pole case number from the plans or from the Engineer.
5. Select the appropriate column under "Standard Foundations" based on soil type and "N" value. Select the appropriate row based on the pole load case.
6. The foundation depth is the value shown in the "Standard Foundations" category where the column and the row intersect.
7. Use Construction Procedures and Design Methods prescribed by FHWA-NHI-10-016 for Reference Drilled Shafts.

Standard Strain Pole Foundation-All Soil Condition

48" Dia. Foundations Concrete Volume (cubic yards) = (0.465) x Drilled Pier Length

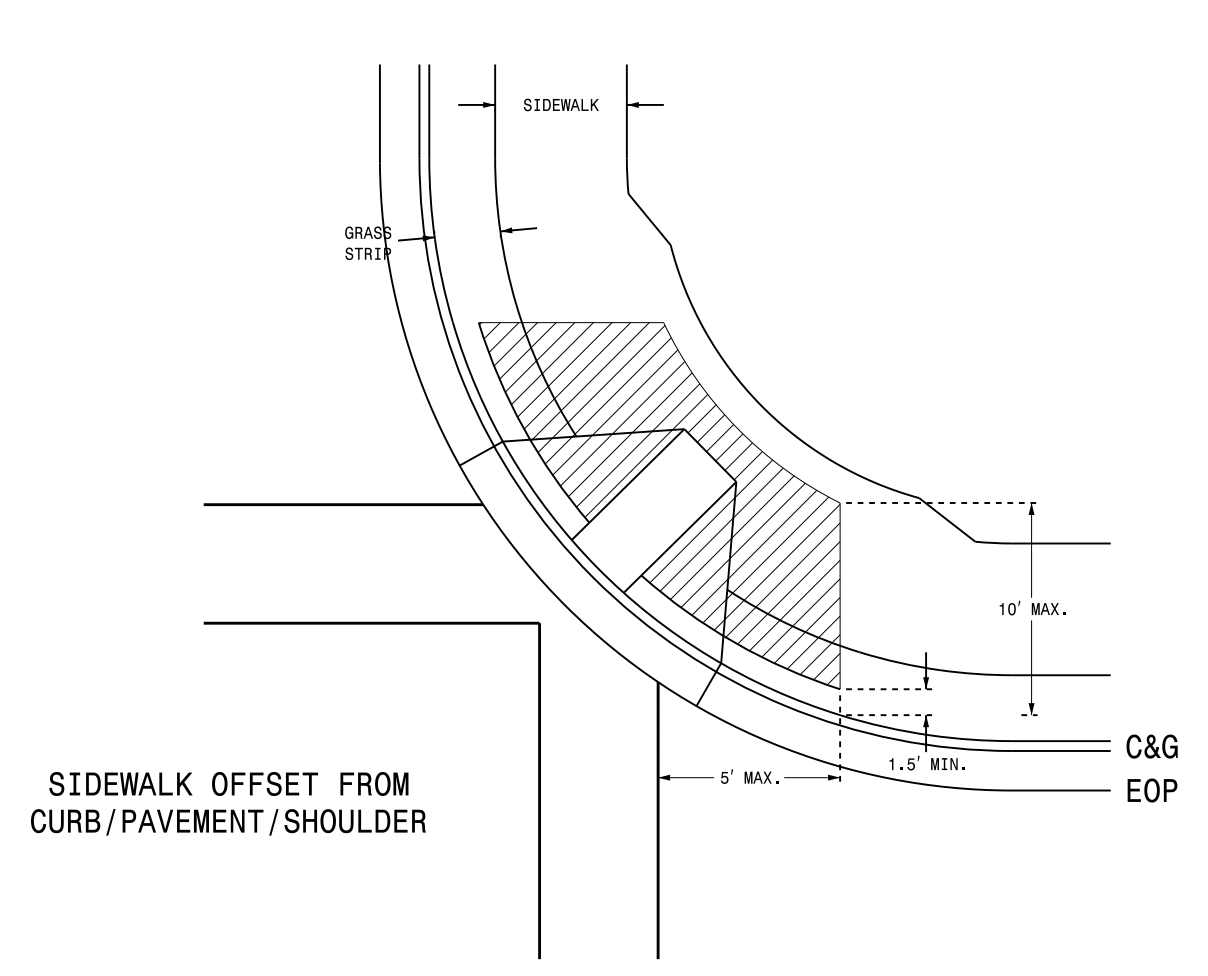
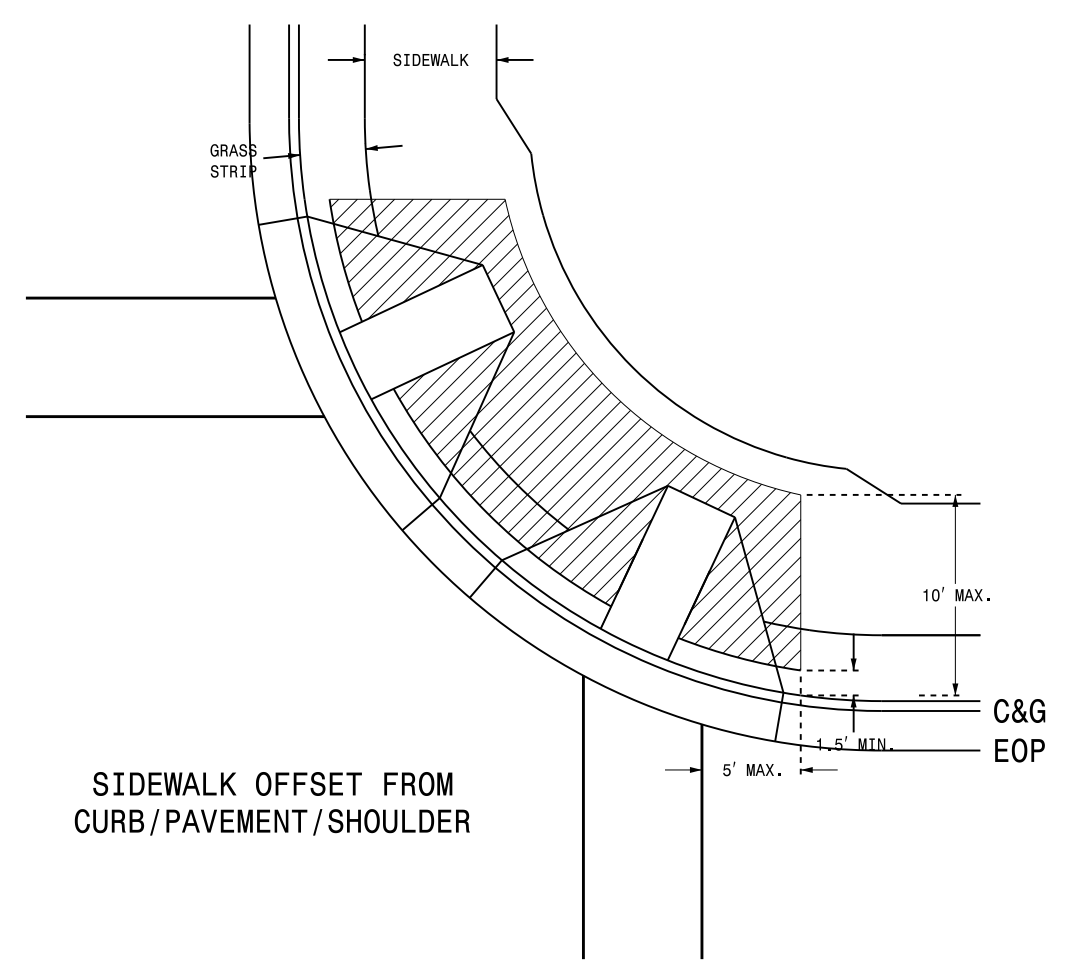
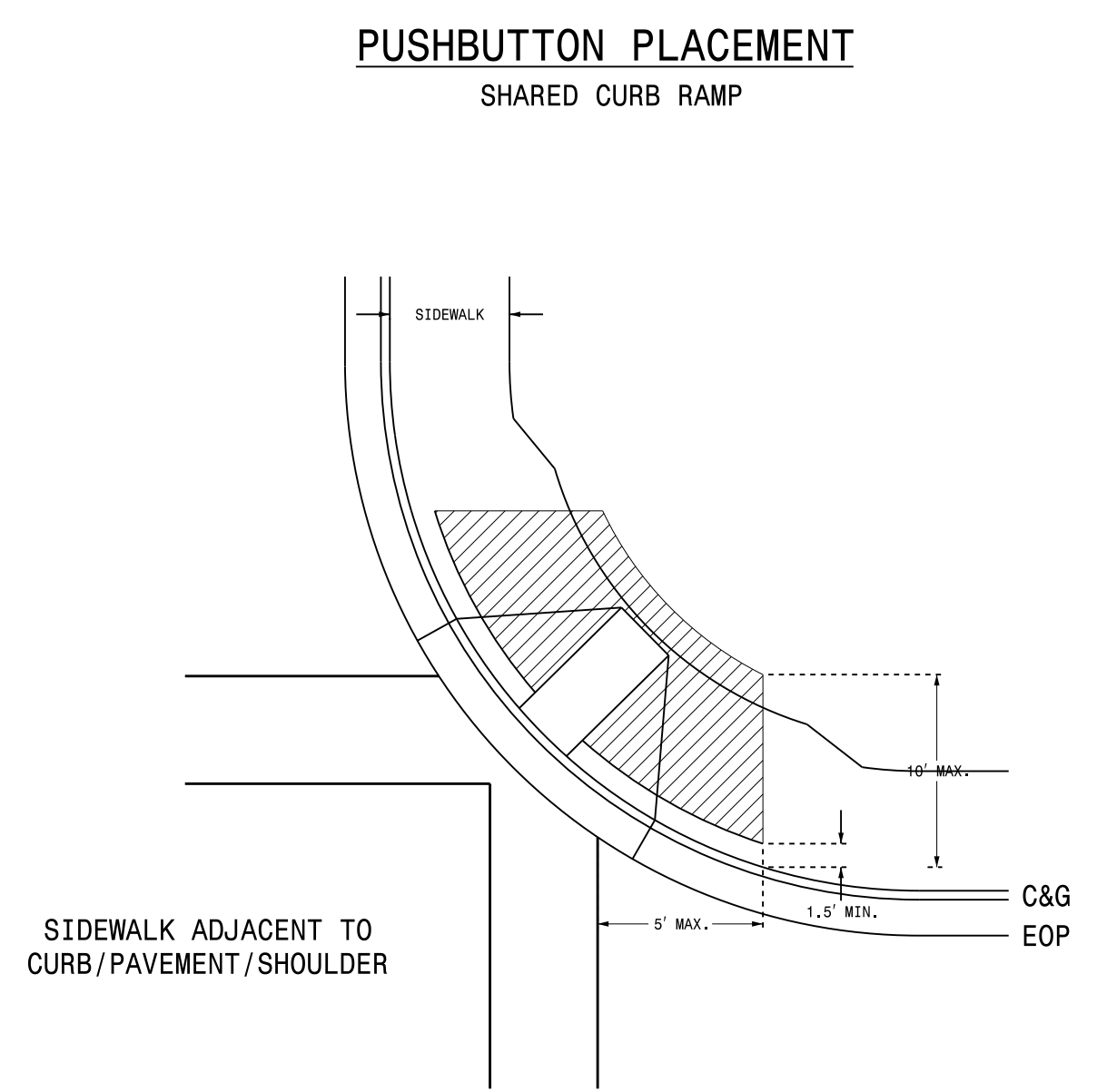
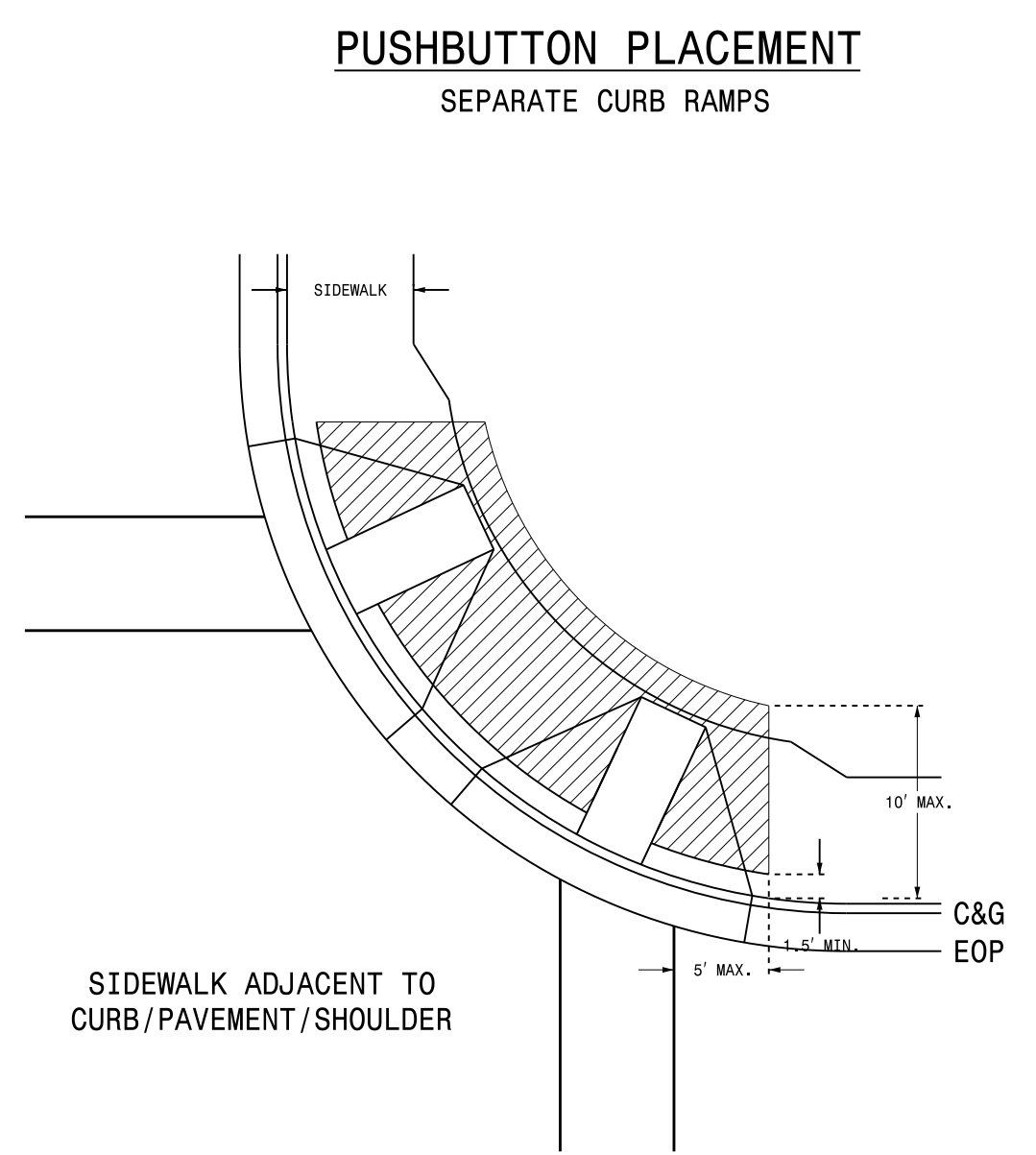
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|---|--|-----------------|
|  | Standard Strain Pole Foundation for All Soil Conditions | |
| | PLAN DATE: FEBRUARY 2016 DESIGNED BY: C.B. COGDILL PREPARED BY: N. BITTING REVIEWED BY: D.C. SARKAR | |
| SCALE: 0 NA NONE | REVISIONS: Changed "Foundation Depth" to "Drilled Pier Length" in Conc. Egn. | DATE: 7/12/2015 |
| DocuSigned by: <i>Debash C. Sarkar</i> | | 2/17/2016 |

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STATE OF NORTH CAROLINA
 DEPT. OF TRANSPORTATION
 DIVISION OF HIGHWAYS
 RALEIGH, N.C.

ENGLISH DETAIL DRAWING FOR
PEDESTRIAN PUSHBUTTON LOCATIONS
 PLACEMENT DETAIL

SHEET 1 OF 3
1705D01



- NOTES**
1. Pushbutton pedestals should not be located further than 10 feet from the edge of curb, shoulder, or pavement.
 2. The face of the pushbutton should be parallel to the applicable crosswalk.
 3. Separate pushbuttons used on the same corner should be separated by a distance of at least 10 feet.
 4. Pushbuttons shall be installed adjacent to a level surface with a maximum reach distance of 10 inches.
 5. Maintain 4 feet of clearance around pedestal if located in sidewalk.
 6. Refer to section 1705 of the 2012 NCDOT Roadway Standard Drawings for Pushbutton Assembly details.
 7. Refer to section 1743 of the 2012 NCDOT Roadway Standard Drawings for Pedestal details.
 8. Contact Division Traffic Engineer for pushbutton location approval prior to installation.
 9. Curb ramps are for symbolic use only and may not reflect actual design or field conditions.

| PROPOSED | LEGEND |
|----------|--------------------------|
| | Signal Pole |
| | Type I Pushbutton Post |
| | Type II Signal Pedestal |
| | Pushbutton & Sign |
| | Pedestrian Signal Head |
| | Curb Ramp |
| | Pushbutton Location Area |

STATE OF NORTH CAROLINA
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 RALEIGH, N.C.

ENGLISH DETAIL DRAWING FOR
PEDESTRIAN PUSHBUTTON LOCATIONS
 PLACEMENT DETAIL

SHEET 1 OF 3
1705D01

See Plate for Title

Prepared in the Offices of:

750 N. Greenfield Parkway
 Garner, NC 27529

SEAL

DocuSigned by:

 18084828744604

6/17/2014

SIGNATURE DATE

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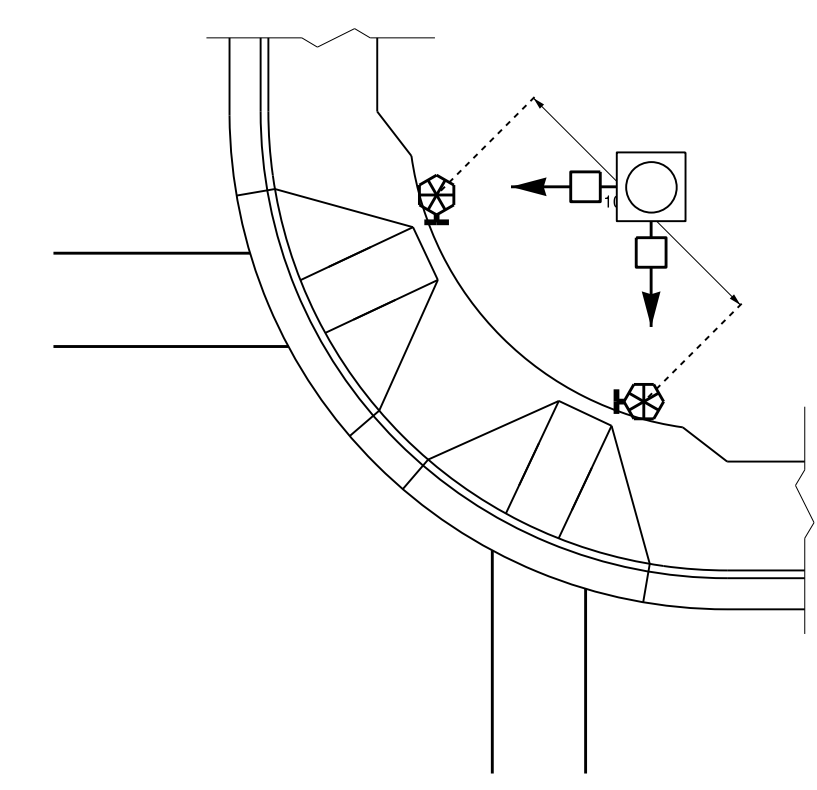
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DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
RALEIGH, N.C.

06-14

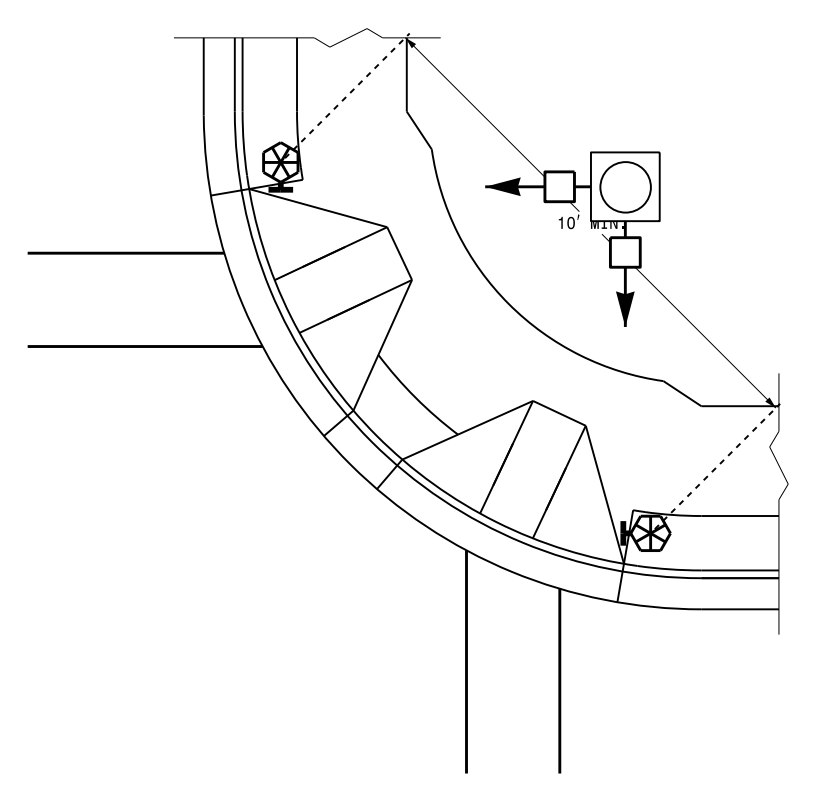
ENGLISH DETAIL DRAWING FOR
PEDESTRIAN PUSHBUTTON LOCATIONS
PLACEMENT DETAIL

SHEET 2 OF 3
1705D01

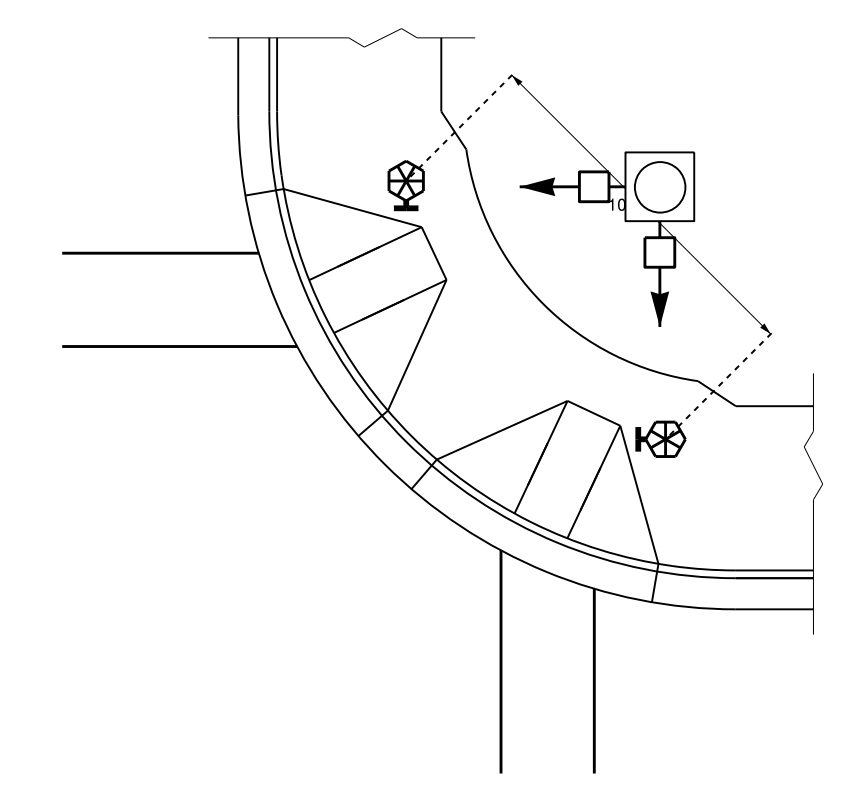
TYPICAL PUSHBUTTON LOCATIONS (CASE I)
SEPARATE CURB RAMPS W/ TYPE I PEDESTALS



BACK OF SIDEWALK IS WITHIN 10'
OF CURB OR PAVEMENT/SHOULDER



GRASS STRIP PLACEMENT IF BACK
OF SIDEWALK EXCEEDS 10' FROM
CURB OR PAVEMENT/SHOULDER



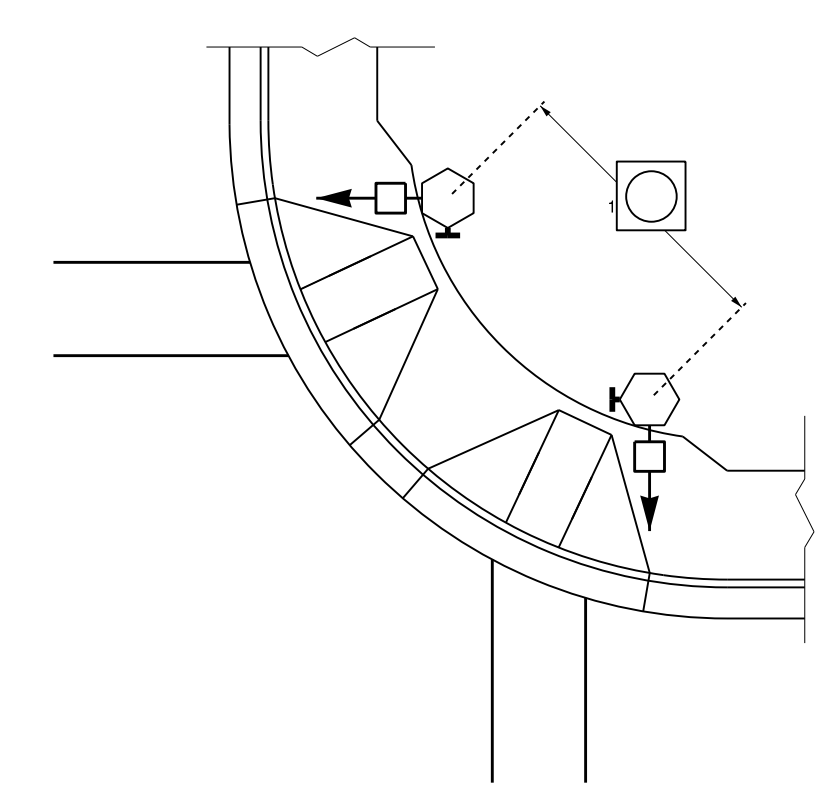
PUSHBUTTON PLACEMENT
IN WIDE SIDEWALK

PROPOSED

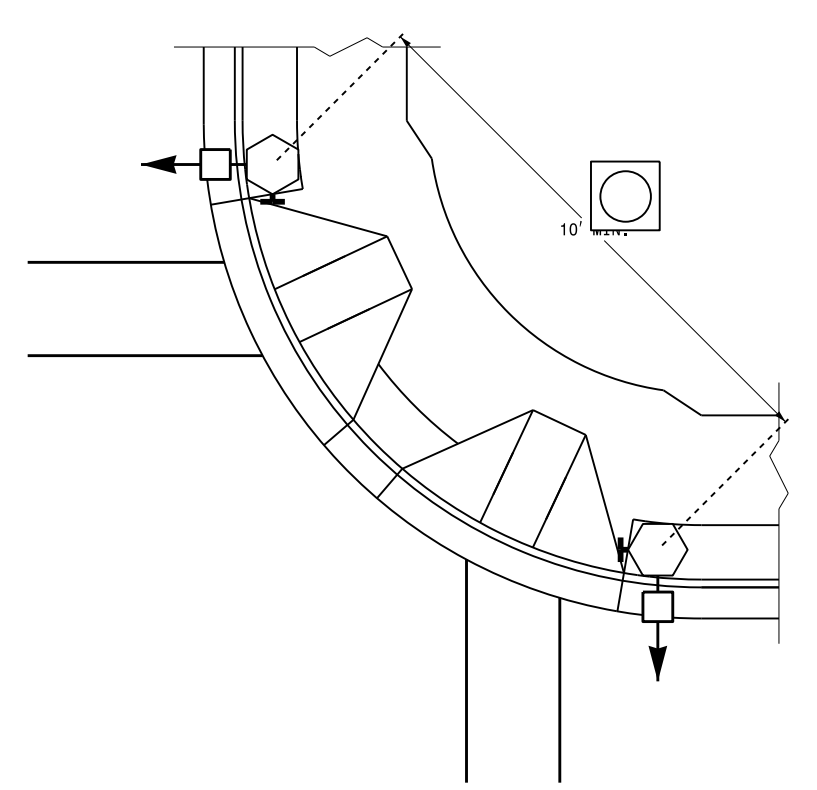
- Signal Pole
- Type I Pushbutton Post
- Type II Signal Pedestal
- Pushbutton & Sign
- Pedestrian Signal Head
- Curb Ramp
- Pushbutton Location Area

LEGEND

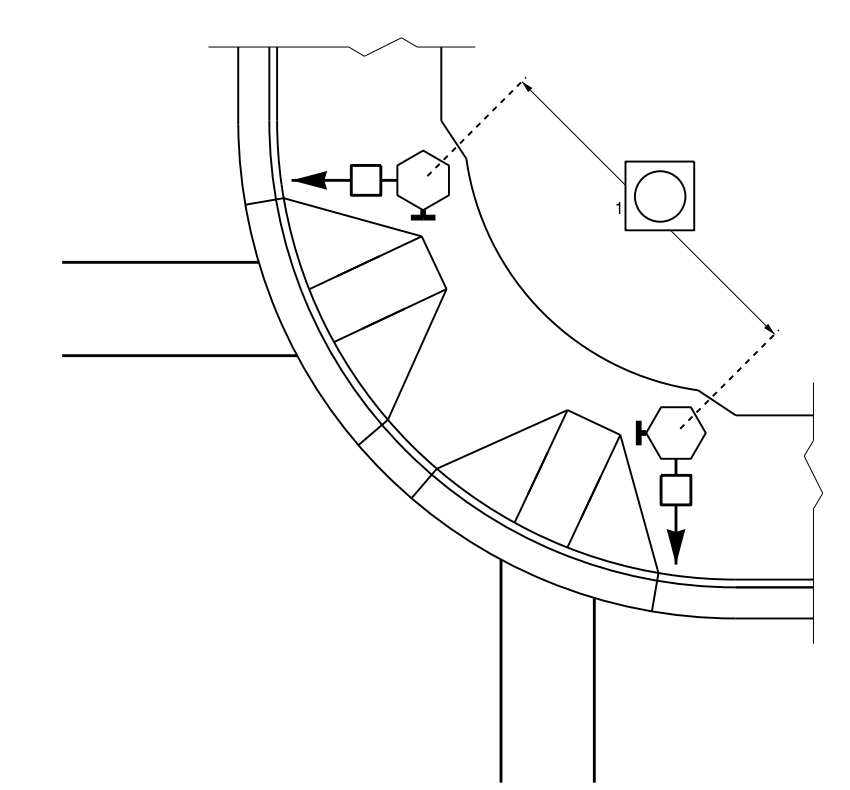
TYPICAL PUSHBUTTON LOCATIONS (CASE II)
SEPARATE CURB RAMPS W/ TYPE II PEDESTALS



BACK OF SIDEWALK IS WITHIN 10'
OF CURB OR PAVEMENT/SHOULDER

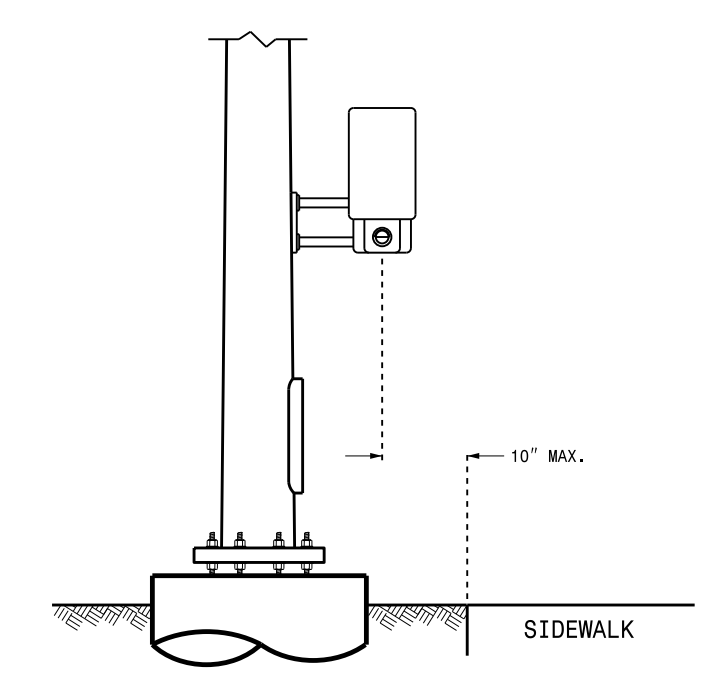


GRASS STRIP PLACEMENT IF BACK
OF SIDEWALK EXCEEDS 10' FROM
CURB OR PAVEMENT/SHOULDER



PUSHBUTTON PLACEMENT
IN WIDE SIDEWALK

OPTIONAL PUSHBUTTON EXTENSION
FACE OF PUSHBUTTON PARALLEL TO
APPLICABLE CROSSWALK



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DIVISION OF HIGHWAYS
RALEIGH, N.C.

06-14

ENGLISH DETAIL DRAWING FOR
PEDESTRIAN PUSHBUTTON LOCATIONS
PLACEMENT DETAIL

SHEET 2 OF 3
1705D01

See Plate for Title

Prepared in the Offices of:

750 N. Greenfield Parkway
Garner, NC 27529

SEAL

DocuSigned by:

1888488274464

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6/17/2014
DATE

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DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
RALEIGH, N.C.

06-14

ENGLISH DETAIL DRAWING FOR
PEDESTRIAN PUSHBUTTON LOCATIONS
PLACEMENT DETAIL

SHEET 3 OF 3
1705D01

STATE OF NORTH CAROLINA
DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
RALEIGH, N.C.

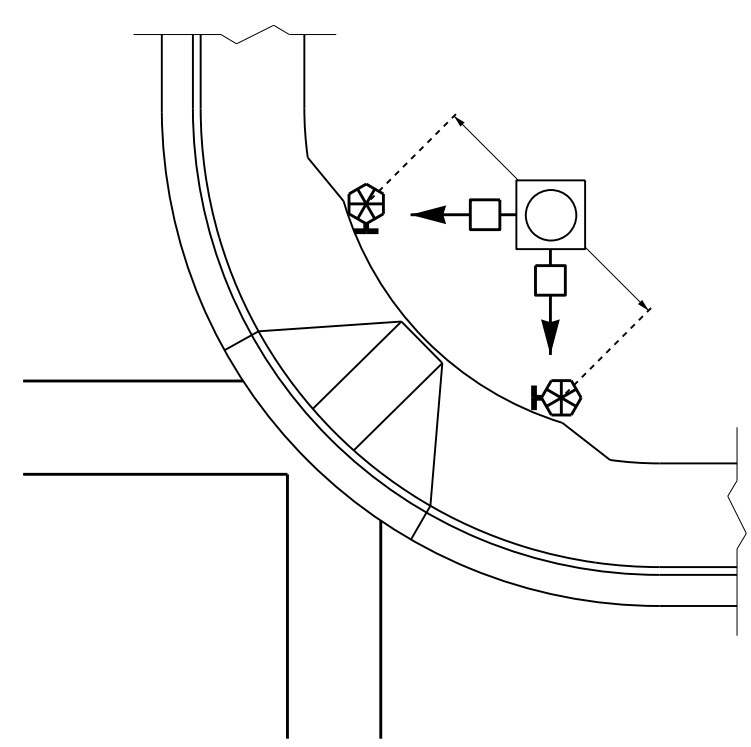
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ENGLISH DETAIL DRAWING FOR
PEDESTRIAN PUSHBUTTON LOCATIONS
PLACEMENT DETAIL

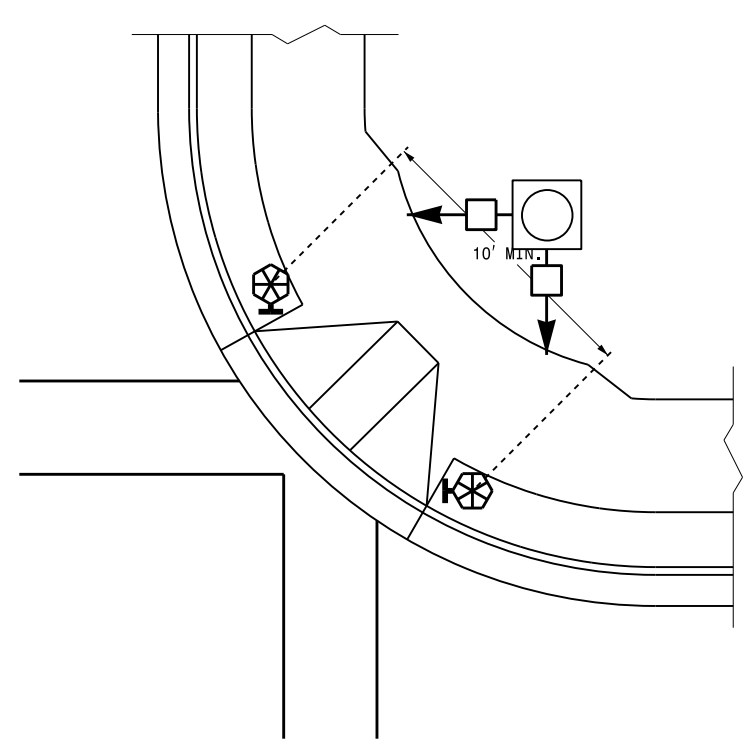
SHEET 3 OF 3
1705D01

TYPICAL PUSHBUTTON LOCATIONS (CASE III)

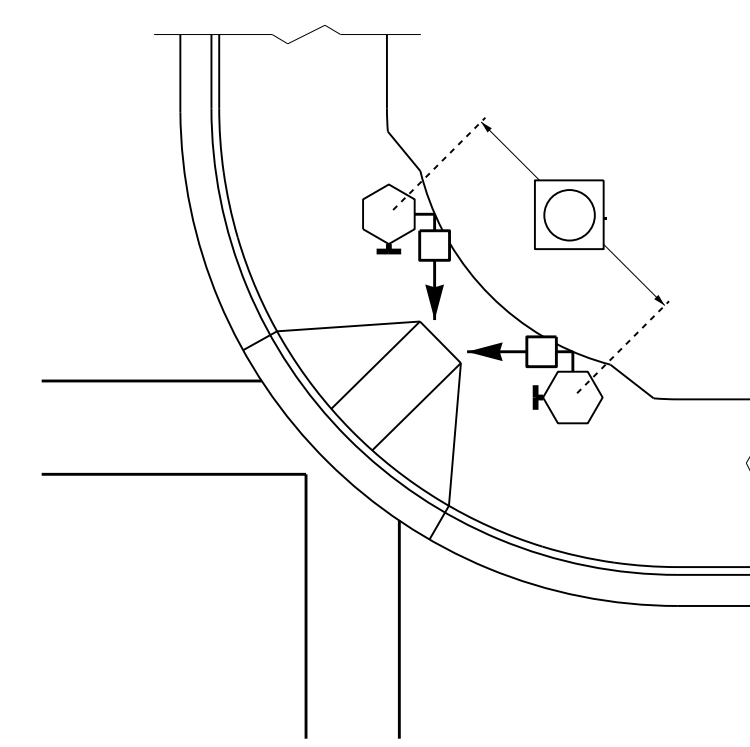
SHARED CURB RAMPS



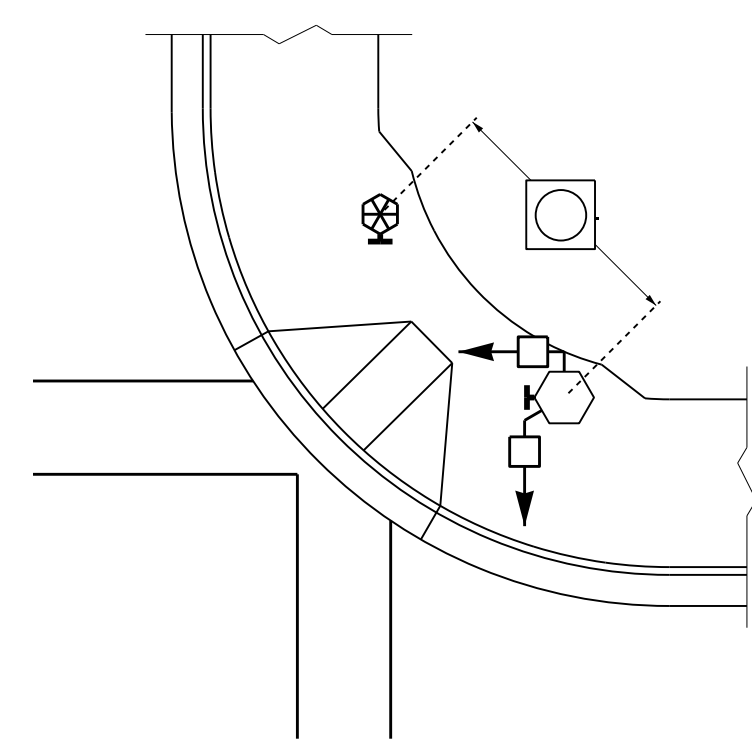
BACK OF SIDEWALK IS WITHIN 10' OF CURB OR PAVEMENT/SHOULDER



GRASS STRIP PLACEMENT IF BACK OF SIDEWALK EXCEEDS 10' FROM CURB OR PAVEMENT/SHOULDER

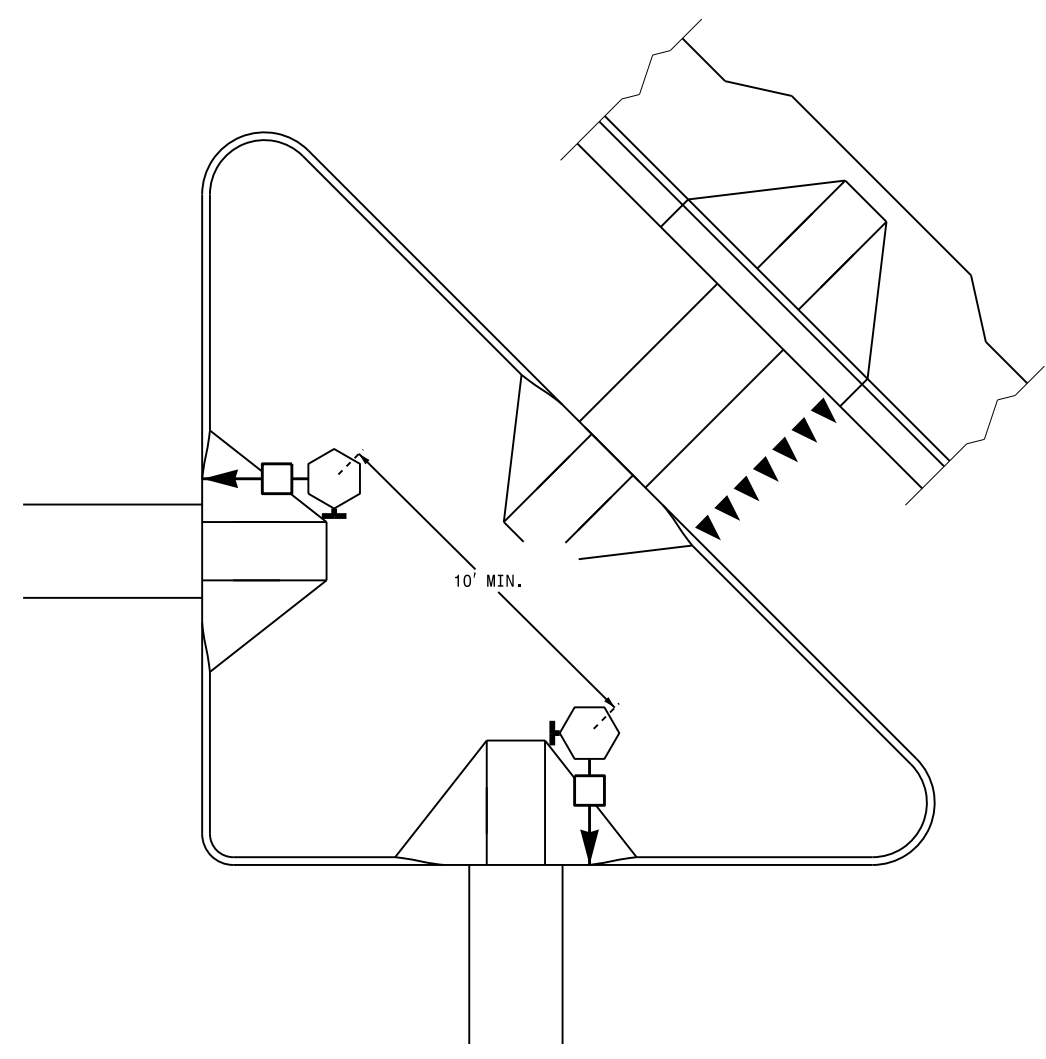


PUSHBUTTON PLACEMENT IN WIDE SIDEWALK (CORRESPONDING PUSHBUTTONS AND SIGNAL HEADS ON DIFFERENT PEDESTALS)

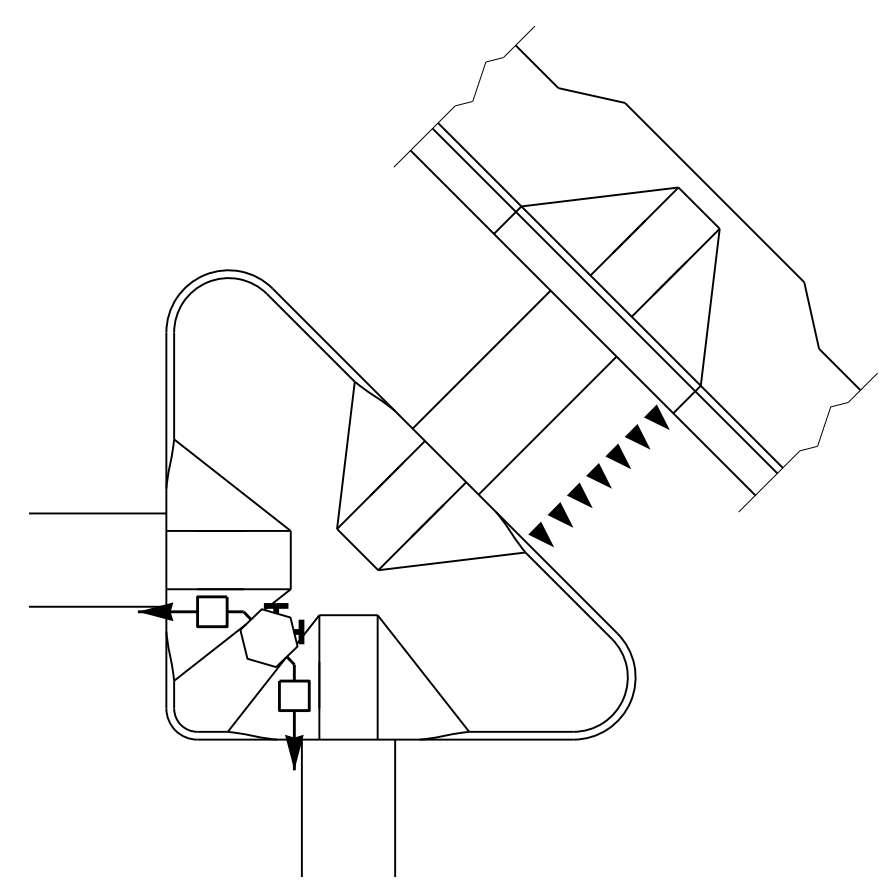


PUSHBUTTON PLACEMENT WITH SHARED TYPE II SIGNAL PEDESTAL AND TYPE I PUSHBUTTON POST

TRAFFIC ISLAND PUSHBUTTON LOCATIONS



PUSHBUTTON PLACEMENT IN LARGE "PORK CHOP ISLAND" WITH SEPARATE PEDESTALS



PUSHBUTTON PLACEMENT IN SMALL "PORK CHOP ISLAND" WITH SHARED PEDESTAL

PUSHBUTTON PLACEMENT IN MEDIAN

TYPE II PEDESTAL (FOR STAGED OR MULTI-PHASE CROSSING)

TYPE I PEDESTAL (FOR COMPLETE CROSSING CURB TO CURB WITH OPTIONAL REFUGE)

| | |
|-----------------|--------------------------|
| PROPOSED | LEGEND |
| | Signal Pole |
| | Type I Pushbutton Post |
| | Type II Signal Pedestal |
| | Pushbutton & Sign |
| | Pedestrian Signal Head |
| | Curb Ramp |
| | Pushbutton Location Area |

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See Plate for Title

Prepared in the Offices of:

750 N. Greenfield Parkway
Garner, NC 27529

SEAL

DocuSigned by:
Robert J. Ziemba
18084982744494

SIGNATURE

6/17/2014
DATE

- 1 INSTALL 3-WIRE COPPER SERVICE ENTRANCE CONDUCTORS
- 2 INSTALL 4-WIRE COPPER FEEDER CONDUCTORS
- 3 INSTALL 3-WIRE COPPER FEEDER CONDUCTORS
- 4 INSTALL SMFO CABLE
- 5 INSTALL CAT 5e ETHERNET CABLE
- 6 INSTALL FIBER OPTIC DROP CABLE
- 7 INSTALL TRACER WIRE
- 8 TRENCH
- 9 INSTALL PVC CONDUIT
- 10 INSTALL RIGID, GALVANIZED STEEL CONDUIT
- 11 INSTALL RIGID, GALVANIZED STEEL RISER WITH WEATHERHEAD
- 12 INSTALL RIGID, GALVANIZED STEEL RISER WITH FIBER OPTIC CABLE SEAL
- 13 INSTALL POLYETHYLENE CONDUIT IN EXISTING OUTERDUCT
- 14 INSTALL POLYETHYLENE CONDUIT
- 15 DIRECTIONAL DRILL CONDUIT
- 16 BORE AND JACK CONDUIT
- 17 INSTALL CABLE(S) IN EXISTING CONDUIT
- 18 INSTALL CABLE(S) IN NEW CONDUIT
- 19 INSTALL CABLE(S) IN EXISTING RISER
- 20 INSTALL CABLE(S) IN NEW RISER
- 21 INSTALL CABLE(S) IN EXISTING CONDUIT STUBOUTS
- 22 INSTALL NEW CONDUIT INTO EXISTING CABINET BASE (USE EXISTING CONDUIT STUB-OUTS WHEN AVAILABLE)
- 23 INSTALL NEW RISER INTO EXISTING CABINET BASE (USE EXISTING CONDUIT STUB-OUTS WHEN AVAILABLE)
- 24 INSTALL NEW CONDUIT INTO EXISTING POLE MOUNTED CABINET
- 25 INSTALL NEW RISER INTO EXISTING POLE MOUNTED CABINET
- 26 TERMINATE FIBER-OPTIC CABLE ON EXISTING INTERCONNECT CENTER IN CCTV EQUIPMENT CABINET
- 27 INSTALL NEW TELEMETRY INTERFACE PANEL IN TRAFFIC SIGNAL CONTROLLER CABINET
- 28 INSTALL INTERCONNECT CENTER, PATCH PANEL, JUMPERS, AND FUSION SPLICE CABLE IN CABINET
- 29 INSTALL UNDERGROUND SPLICE ENCLOSURE
- 30 INSTALL AERIAL SPLICE ENCLOSURE
- 31 INSTALL UNDERGROUND SPLICE ENCLOSURE
- 32 MODIFY EXISTING SPLICE ENCLOSURE
- 33 REMOVE EXISTING SPLICE CABINET

- 34 INSTALL CABINET FOUNDATION
- 35 REMOVE EXISTING CABINET FOUNDATION
- 36 INSTALL CCTV CAMERA ASSEMBLY
- 37 INSTALL CCTV CAMERA WOOD POLE
- 38 INSTALL CCTV CAMERA METAL POLE AND FOUNDATION
- 39 INSTALL STANDARD (ELECTRICAL) JUNCTION BOX
- 40 INSTALL OVERSIZED JUNCTION BOX
- 41 INSTALL SPECIAL OVERSIZED JUNCTION BOX
- 42 INSTALL WOOD POLE
- 43 REMOVE EXISTING WOOD POLE
- 44 INSTALL AERIAL GUY ASSEMBLY
- 45 INSTALL STANDARD GUY ASSEMBLY
- 46 INSTALL SIDEWALK GUY ASSEMBLY
- 47 INSTALL MESSENGER CABLE
- 48 REMOVE EXISTING COMMUNICATIONS CABLE AND MESSENGER CABLE
- 49 REMOVE EXISTING COMMUNICATIONS CABLE
- 50 INSTALL TELEPHONE SERVICE
- 51 INSTALL CABLE STORAGE RACKS (SNOW SHOES) AND STORE 100 FEET OF CABLE
- 52 INSTALL DELINEATOR MARKER
- 53 STORE 30 FEET OF COMMUNICATIONS CABLE (EACH CABLE), EXCEPT AS NOTED ON PLANS
- 54 LASH CABLE(S) TO EXISTING MESSENGER CABLE
- 55 LASH CABLE(S) TO EXISTING SIGNAL /COMMUNICATION CABLE
- 56 LASH CABLE(S) TO NEW MESSENGER CABLE
- 57 MODIFY EXISTING ELECTRICAL SERVICE
- 58 INSTALL NEW ELECTRICAL SERVICE
- 59 INSTALL NEW POLE MOUNTED CABINET
- 60 INSTALL LOOP LEAD-IN CABLE

LEGEND

| | |
|--|---|
| | NEW FIBER OPTIC COMMUNICATIONS CABLE |
| | EXISTING COMMUNICATIONS CABLE |
| | EXISTING COMMUNICATIONS CABLE TO BE REMOVED |
| | NEW CONDUIT |
| | EXISTING CONDUIT |
| | NEW DIRECTIONAL DRILLED CONDUIT |
| | NEW GUARDRAIL |
| | NEW CHAIN LINK FENCE |
| | EXISTING GUARDRAIL |
| | EXISTING GUIDERAIL |
| | EXISTING CONCRETE BARRIER |
| | EXISTING RIGHT OF WAY |
| | NEW JUNCTION BOX |
| | EXISTING JUNCTION BOX |
| | NEW SPECIAL OVERSIZED JUNCTION BOX WITH SPLICE ENCLOSURE |
| | EXISTING SPECIAL OVERSIZED JUNCTION BOX WITH NEW SPLICE ENCLOSURE |
| | EXISTING SPECIAL OVERSIZED JUNCTION BOX WITHOUT SPLICE ENCLOSURE |
| | NEW WOOD POLE |
| | EXISTING WOOD POLE |
| | NEW SPLICE ENCLOSURE |
| | EXISTING SPLICE ENCLOSURE |
| | NEW METAL POLE |
| | EXISTING METAL POLE |
| | NEW CCTV CAMERA ASSEMBLY |
| | EXISTING CCTV CAMERA ASSEMBLY |
| | NEW STANDARD GUY ASSEMBLY |
| | EXISTING STANDARD GUY ASSEMBLY |
| | NEW SIDEWALK GUY ASSEMBLY |
| | NEW SIGNAL CABINET |
| | EXISTING SIGNAL CABINET |
| | NEW FIELD EQUIPMENT CABINET |
| | EXISTING FIELD EQUIPMENT CABINET |
| | NEW YAGI ANTENNA (SINGLE) |
| | 2.4 GHZ BROADBAND ETHERNET RADIO |
| | NEW ELECTRICAL SERVICE |
| | EXISTING ELECTRICAL SERVICE |
| | SIGNAL POLE |
| | EXISTING ITS DEVICE NUMBER |
| | SIGNAL INVENTORY NUMBER |

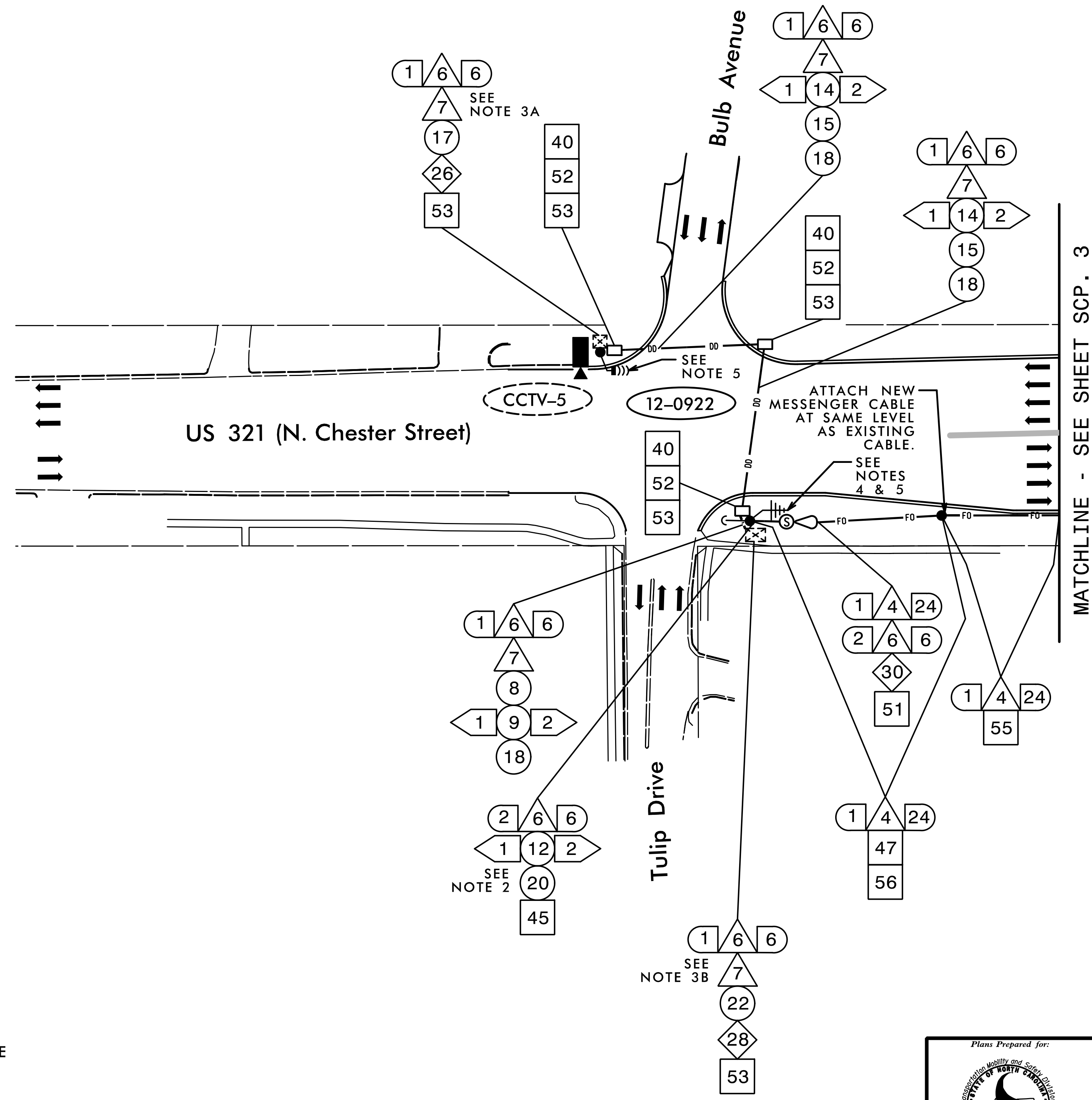
CONSTRUCTION NOTE SYMBOLOGY KEY

| | | |
|---------------------------------|--|--|
| NUMBER OF CABLE(S), LOOPS, ETC. | | NUMBER OF FIBERS / TWISTED PAIRS PER CABLE, ETC. |
| NUMBER OF RISER(S) / CONDUIT(S) | | DIAMETER OF RISER(S) / CONDUIT(S) (INCH) |
| NUMBER OF DEVICES | | NUMBER OF FIBERS |

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HNTB HNTB NORTH CAROLINA, P.C.
 343 E. Six Forks Road, Suite 200
 Raleigh, North Carolina 27609
 NC License No: C-1554
 (919) 546-8997

| Plans Prepared for: 250 N. Greenfield Place, Garner, NC 27529 | CONSTRUCTION NOTES AND LEGEND Division 12 Gaston Co. Gastonia PLAN DATE: September 2016 REVIEWED BY: H.L. Winstead PREPARED BY: J.A. Wagner REVIEWED BY: N.R. Simmons | SEAL NATASHA R. SIMMONS ENGINEER | | | | | | | | | |
|--|--|--|-------|------|--|--|--|--|--|--|--|
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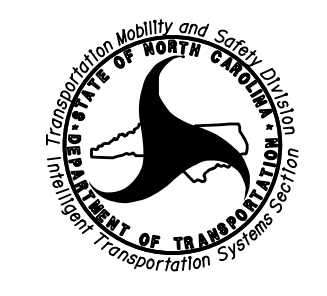
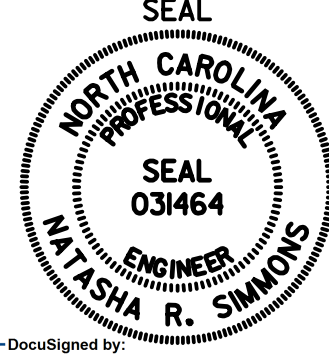
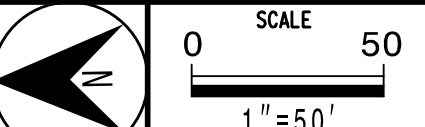


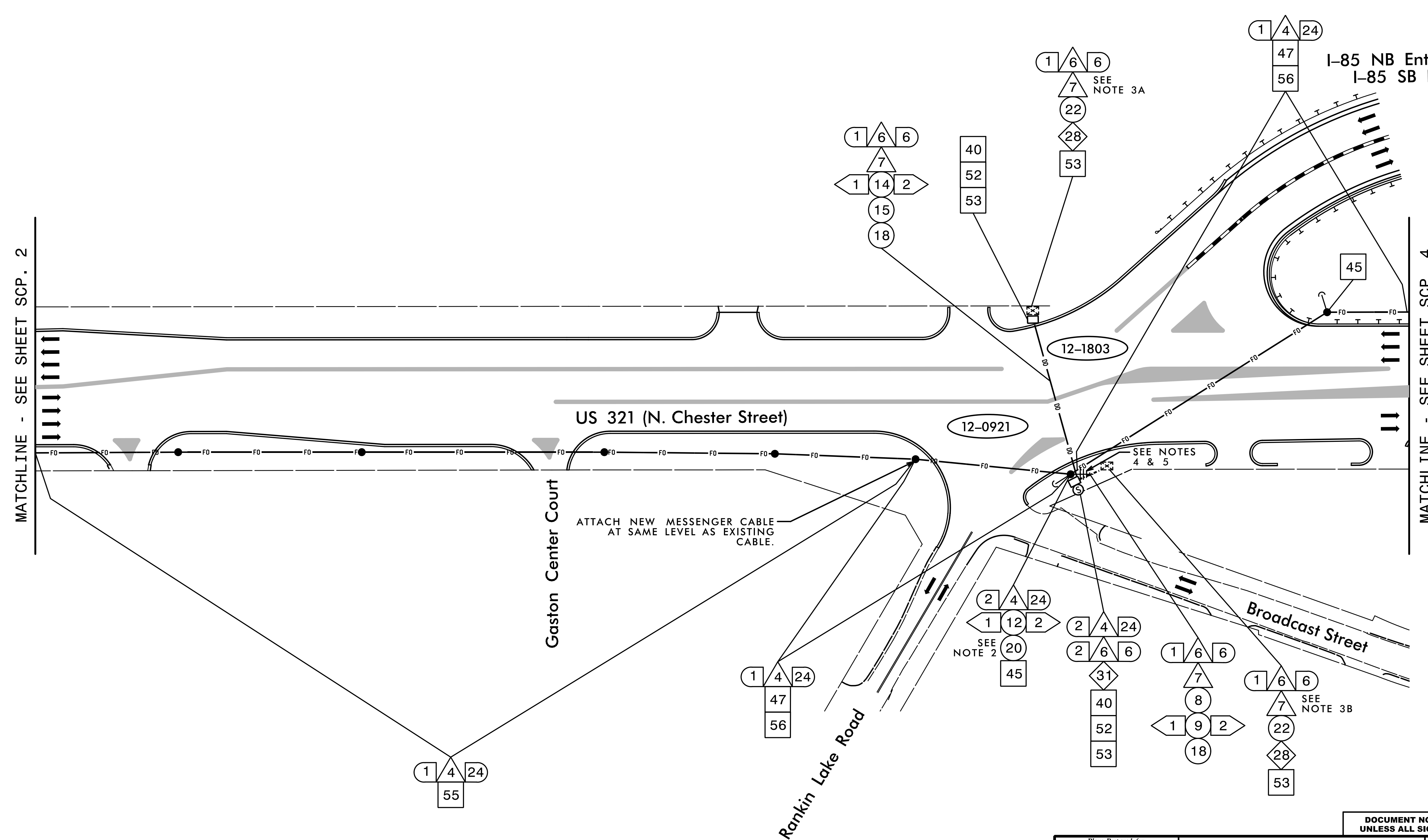
NOTES:

1. ATTACH MESSENGER CABLE 40" BELOW POWER AND ON THE FRONT SIDE OF THE POLE UNLESS OTHERWISE NOTED.
2. BOND MESSENGER CABLE AND RISER TO POLE GROUND.
- 3A. BOND TRACER WIRE TO EQUIPMENT GROUND BUS.
- 3B. DO NOT BOND TRACER WIRE TO EQUIPMENT GROUND BUS.
4. RELOCATE EXISTING WIRELESS ASSEMBLY TO NEW CABINET DURING WORK ZONE TRAFFIC CONTROL TMP PHASE 1, STEP 1.
5. AFTER WORK ZONE TRAFFIC CONTROL TMP FINAL PHASE AND FIBER-OPTIC CABLE CONSTRUCTION IS COMPLETE, REMOVE EXISTING WIRELESS ASSEMBLY AND DELIVER TO DIVISION 12 TRAFFIC SERVICES.

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 HNTB NORTH CAROLINA, P.C.
 343 E. Six Forks Road, Suite 200
 Raleigh, North Carolina 27609
 NC License No: C-1554
 (919) 546-8997

| <p>Plans Prepared for:</p>  <p>250 N. Greenfield Place, Garner, NC 27529</p> | <p>CABLE ROUTING PLAN</p> | |  | | | | | | | | |
|---|--|--|---|-----------|-------|------|--|--|--|--|--|
| | <p>Division 12 Gaston Co. Gastonia</p> <p>PLAN DATE: September 2016 REVIEWED BY: H.L. Winstead</p> <p>PREPARED BY: J.A. Wagner REVIEWED BY: N.R. Simmons</p> | <table border="1"> <thead> <tr> <th>REVISIONS</th> <th>INIT.</th> <th>DATE</th> </tr> </thead> <tbody> <tr> <td> </td> <td> </td> <td> </td> </tr> <tr> <td> </td> <td> </td> <td> </td> </tr> </tbody> </table> | | REVISIONS | INIT. | DATE | | | | | |
| REVISIONS | INIT. | DATE | | | | | | | | | |
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|  | <p>DocuSigned by: <i>Natasha R. Simmons</i> 11/8/2016</p> <p>PROFESSIONAL ENGINEER SIGNATURE DATE</p> | | <p>CADD File name: I-5000_SCP-02.dgn</p> | | | | | | | | |



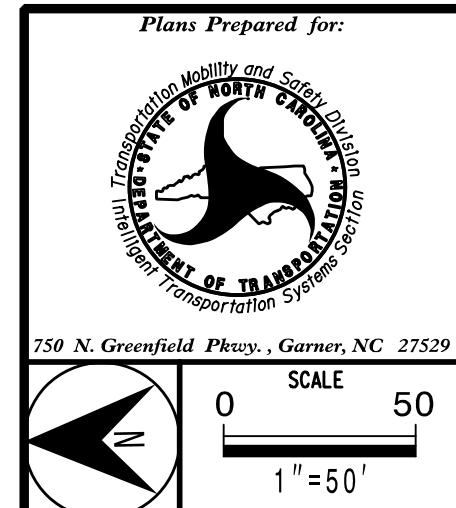
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5. AFTER WORK ZONE TRAFFIC CONTROL TMP FINAL PHASE AND FIBER-OPTIC CABLE CONSTRUCTION IS COMPLETE, REMOVE EXISTING WIRELESS ASSEMBLY AND DELIVER TO DIVISION 12 TRAFFIC SERVICES.

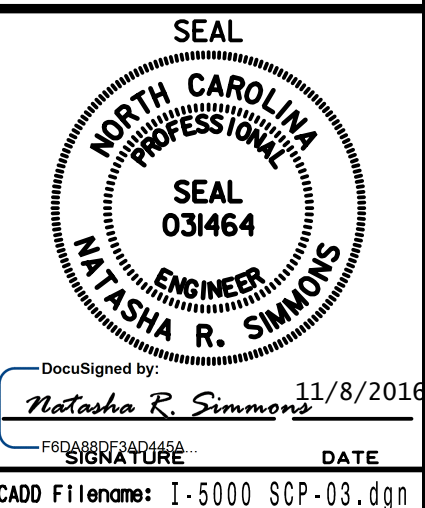
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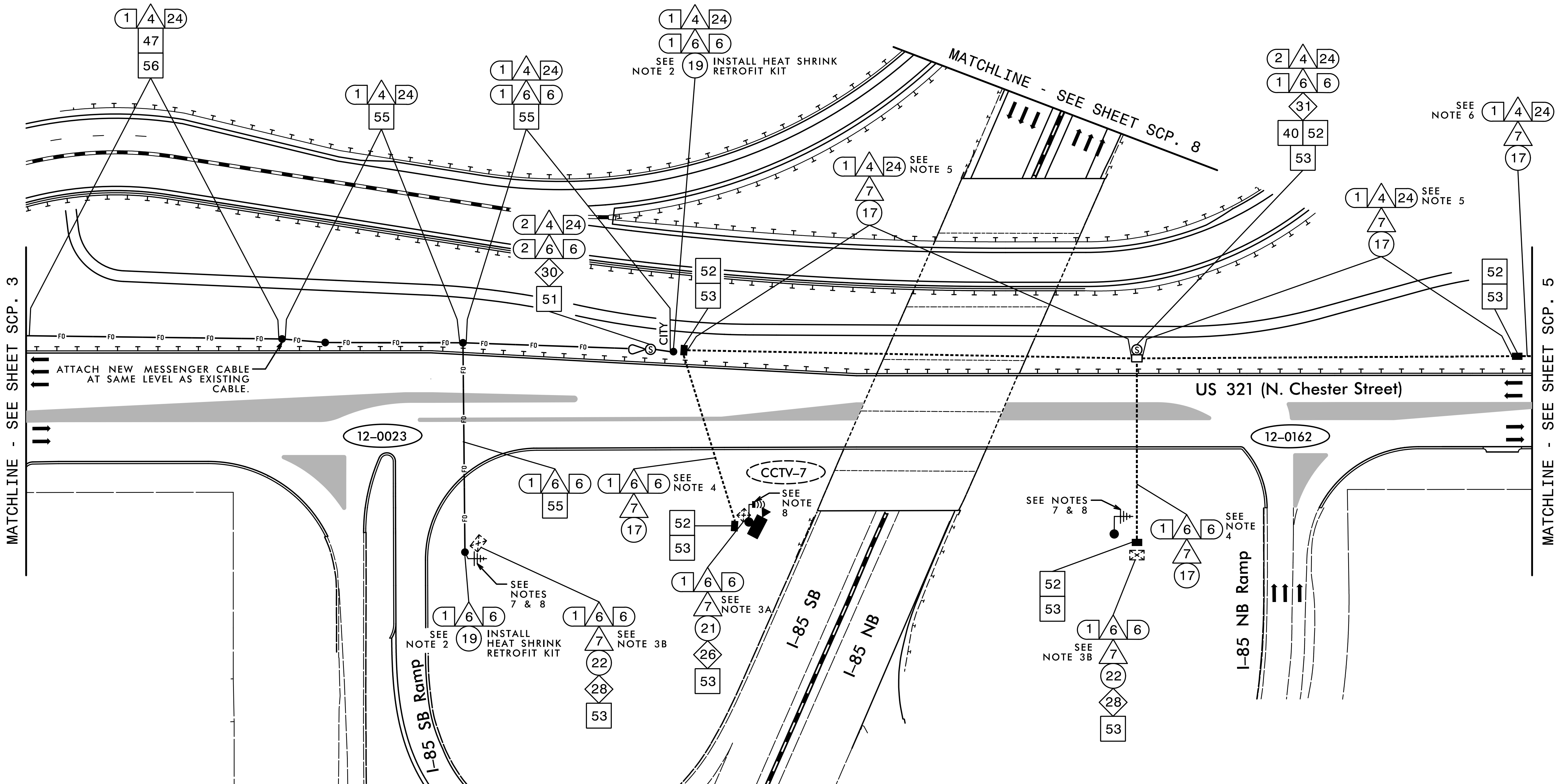
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 Raleigh, North Carolina 27609
 NC License No: C-1554
 (919) 546-8997



| CABLE ROUTING PLAN | |
|---------------------------|----------------------------|
| Division 12 | Gaston Co. Gastonia |
| PLAN DATE: September 2016 | REVIEWED BY: H.L. Winstead |
| PREPARED BY: J.A. Wagner | REVIEWED BY: N.R. Simmons |
| REVISIONS | INIT. DATE |
| | |
| | |
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DocuSigned by:
 Natasha R. Simmons 11/8/2016
 SIGNATURE DATE
 CADD File Name: I-5000 SCP-03.dgn



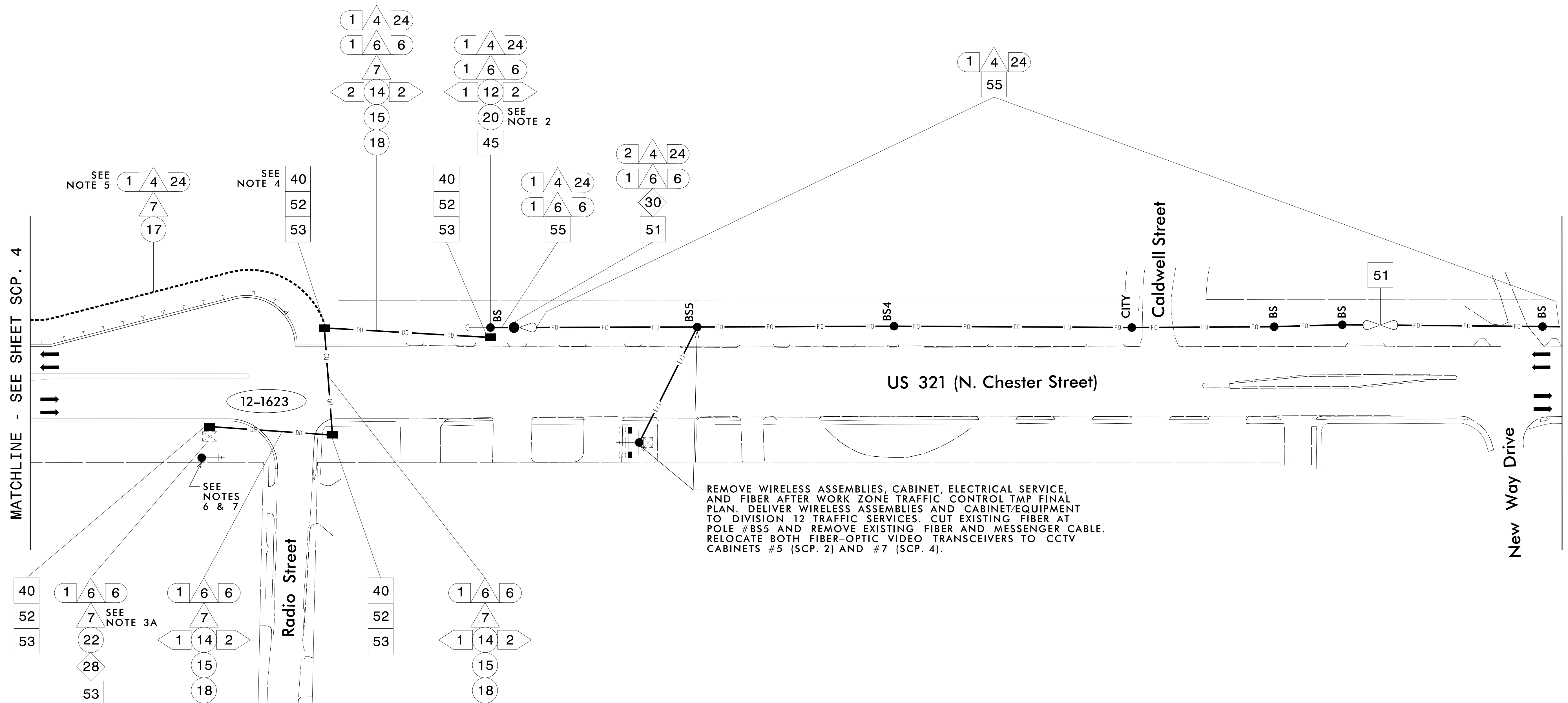
NOTES:

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2. BOND MESSENGER CABLE AND RISER TO POLE GROUND.
- 3A. BOND TRACER WIRE TO EQUIPMENT GROUND BUS.
- 3B. DO NOT BOND TRACER WIRE TO EQUIPMENT GROUND BUS.
4. PULL OUT EXISTING 6-FIBER CABLE AND PULL IN NEW 6-FIBER CABLE.
5. PULL OUT EXISTING 24-FIBER CABLE AND PULL IN NEW 24-FIBER CABLE.
6. INSTALL FIBER IN SPARE CONDUIT.
7. RELOCATE EXISTING WIRELESS ASSEMBLY TO NEW CABINET DURING WORK ZONE TRAFFIC CONTROL TMP PHASE 1, STEP 1.
8. AFTER WORK ZONE TRAFFIC CONTROL TMP FINAL PHASE AND FIBER-OPTIC CABLE CONSTRUCTION IS COMPLETE, REMOVE EXISTING WIRELESS ASSEMBLY AND DELIVER TO DIVISION 12 TRAFFIC SERVICES.

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| | | |
|-------------------------|---|---|
| | CABLE ROUTING PLAN | |
| | Division 12 Gaston Co. Gastonia PLAN DATE: September 2016 REVIEWED BY: H.L. Winstead PREPARED BY: J.A. Wagner REVIEWED BY: N.R. Simmons | 250 N. Greenfield Place, Garner, NC 27529 SCALE 0 50 1" = 50' |
| REVISIONS INIT. DATE | DATED BY: Notasha R. Simmons 11/8/2016 SIGNATURE DATE CADD File Name: I-5000 SCP-04.dgn | |



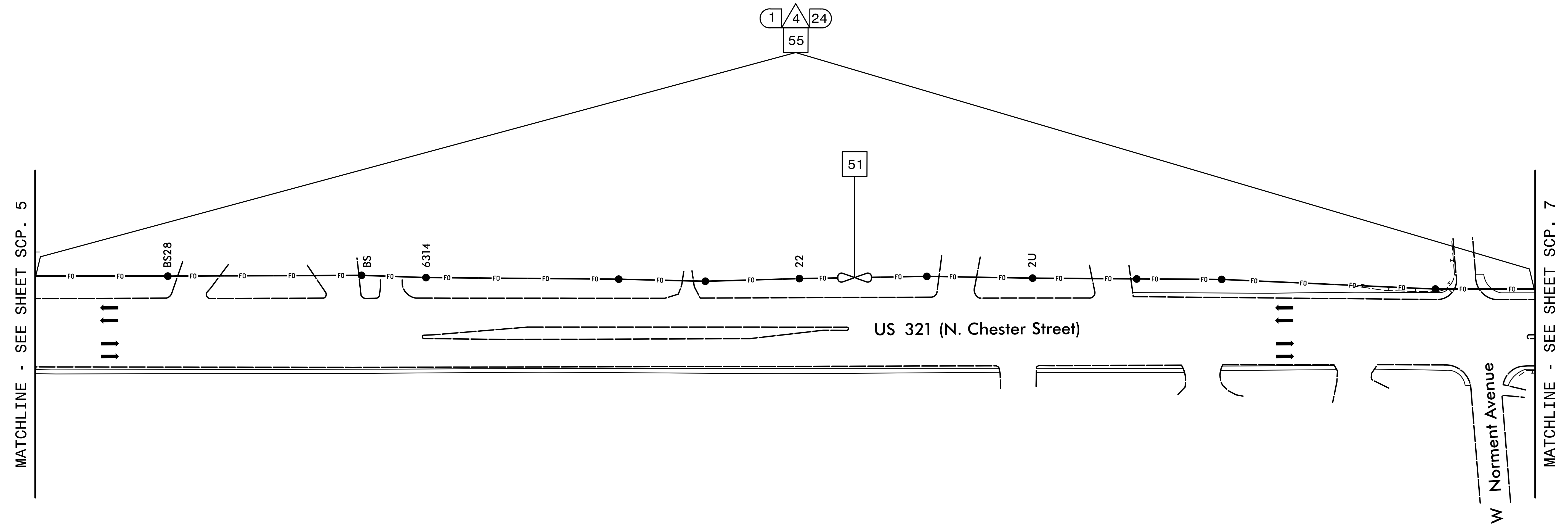
NOTES:

1. ATTACH MESSENGER CABLE 40" BELOW POWER AND ON THE FRONT SIDE OF THE POLE UNLESS OTHERWISE NOTED.
2. BOND MESSENGER CABLE AND RISER TO POLE GROUND.
- 3A. BOND TRACER WIRE TO EQUIPMENT GROUND BUS.
- 3B. DO NOT BOND TRACER WIRE TO EQUIPMENT GROUND BUS.
4. INTERCEPT EXISTING CONDUITS INSTALLED BY OTHERS FOR USE BY SIGNAL SYSTEM FIBER.
5. INSTALL FIBER IN SPARE CONDUIT.
6. RELOCATE EXISTING WIRELESS ASSEMBLY TO NEW CABINET DURING WORK ZONE TRAFFIC CONTROL TMP PHASE 1, STEP 1.
7. AFTER WORK ZONE TRAFFIC CONTROL TMP FINAL PHASE AND FIBER-OPTIC CABLE CONSTRUCTION IS COMPLETE, REMOVE EXISTING WIRELESS ASSEMBLY AND DELIVER TO DIVISION 12 TRAFFIC SERVICES.

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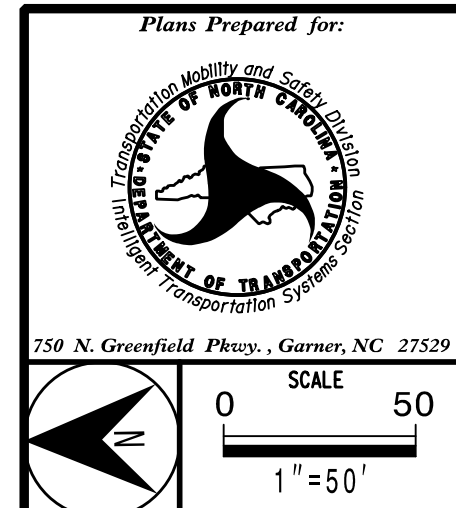
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| <p>Plans Prepared for:</p> <p>750 N. Greenfield Pkwy., Garner, NC 27529</p> | <p>CABLE ROUTING PLAN</p> | | <p>SEAL</p> <p>SEAL 031464 NATASHA R. SIMMONS ENGINEER</p> | | | | | | | |
|---|--|---|--|-----|-----------|-------|------|--|--|--|
| | <p>Division 12 Gaston Co. Gastonia</p> <p>PLAN DATE: September 2016 REVIEWED BY: H.L. Winstead</p> <p>PREPARED BY: J.A. Wagner REVIEWED BY: N.R. Simmons</p> | <p>REVISIONS</p> <table border="1"> <thead> <tr> <th>NO.</th> <th>REVISIONS</th> <th>INIT.</th> <th>DATE</th> </tr> </thead> <tbody> <tr> <td> </td> <td> </td> <td> </td> <td> </td> </tr> </tbody> </table> | | NO. | REVISIONS | INIT. | DATE | | | |
| NO. | REVISIONS | INIT. | DATE | | | | | | | |
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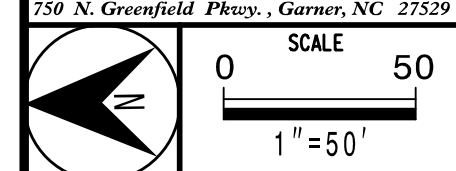
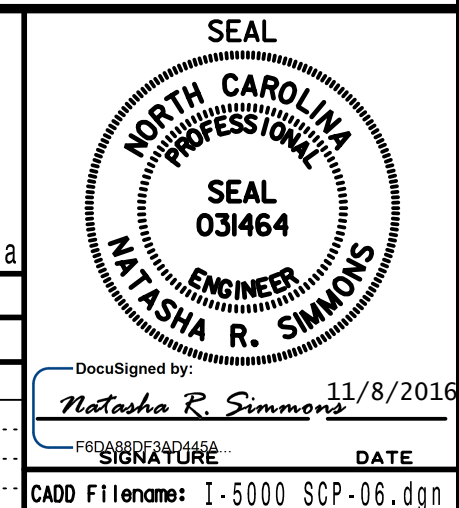


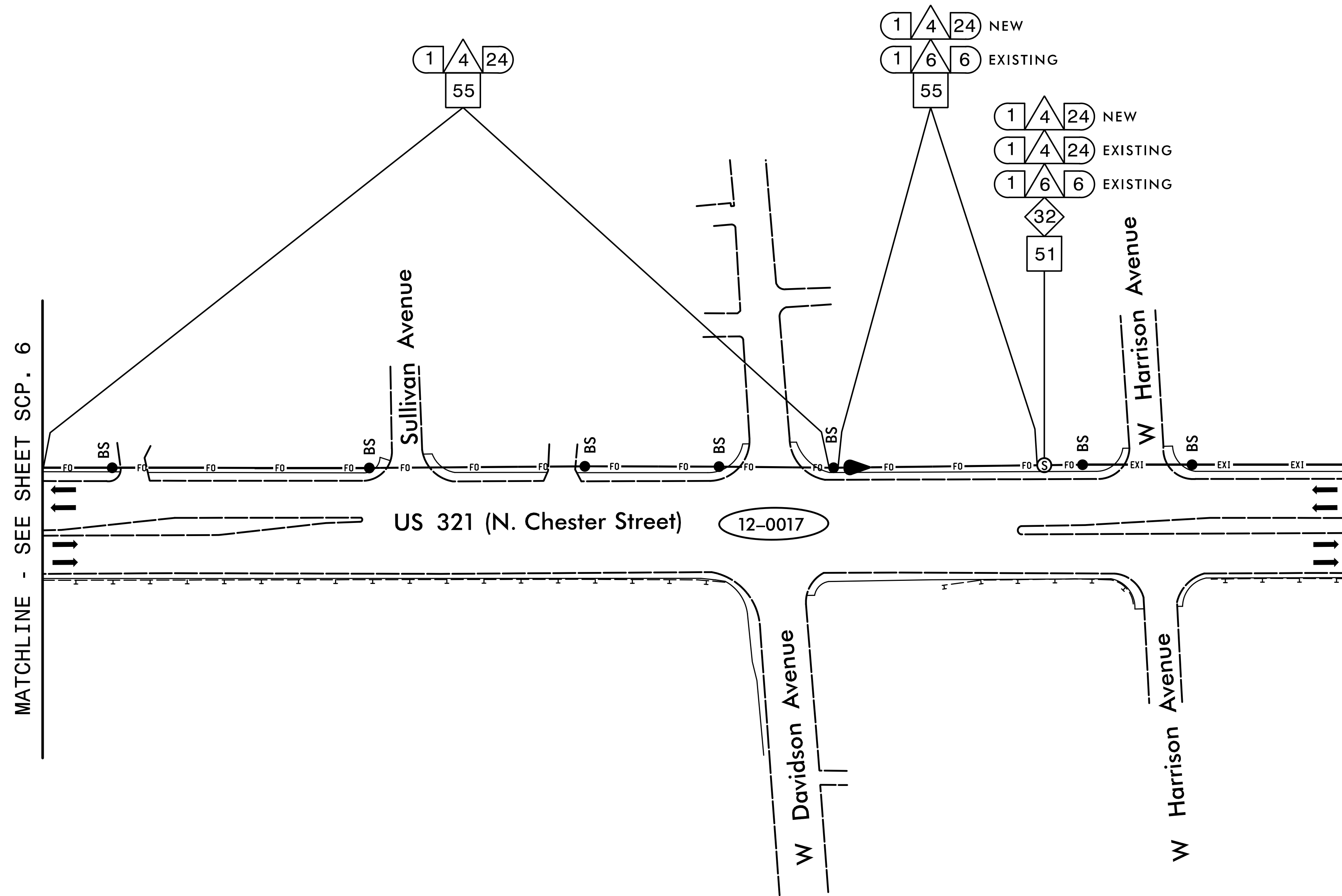
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| | |
|---------------------------|----------------------------|
| CABLE ROUTING PLAN | |
| Division 12 | Gaston Co. Gastonia |
| PLAN DATE: September 2016 | REVIEWED BY: H.L. Winstead |
| PREPARED BY: J.A. Wagner | REVIEWED BY: N.R. Simmons |
| REVISIONS | INIT. DATE |
| | |
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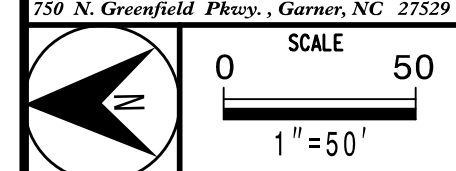
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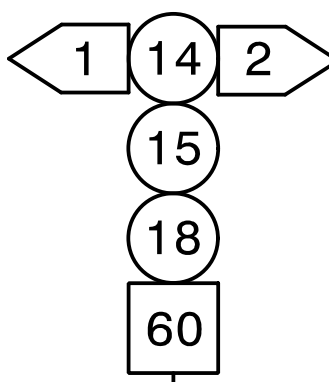
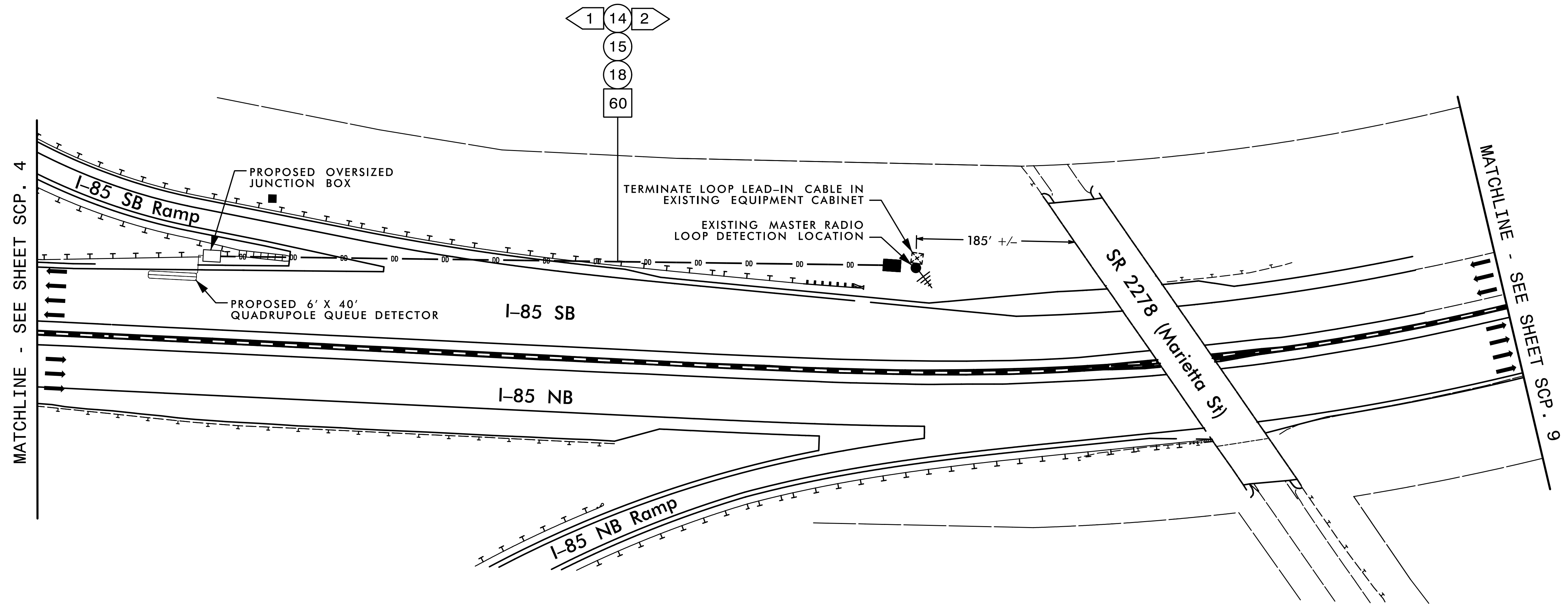
259 N. Greenfield Place, Garner, NC 27529

| | |
|---------------------------|----------------------------|
| CABLE ROUTING PLAN | |
| Division 12 | Gaston Co. Gastonia |
| PLAN DATE: September 2016 | REVIEWED BY: H.L. Winstead |
| PREPARED BY: J.A. Wagner | REVIEWED BY: N.R. Simmons |
| REVISIONS | INIT. DATE |
| | |
| | |

SEAL

DocuSigned by:
Notasha R. Simmons 11/8/2016
 SIGNATURE DATE
 CADD File name: I-5000_SCP-07.dgn





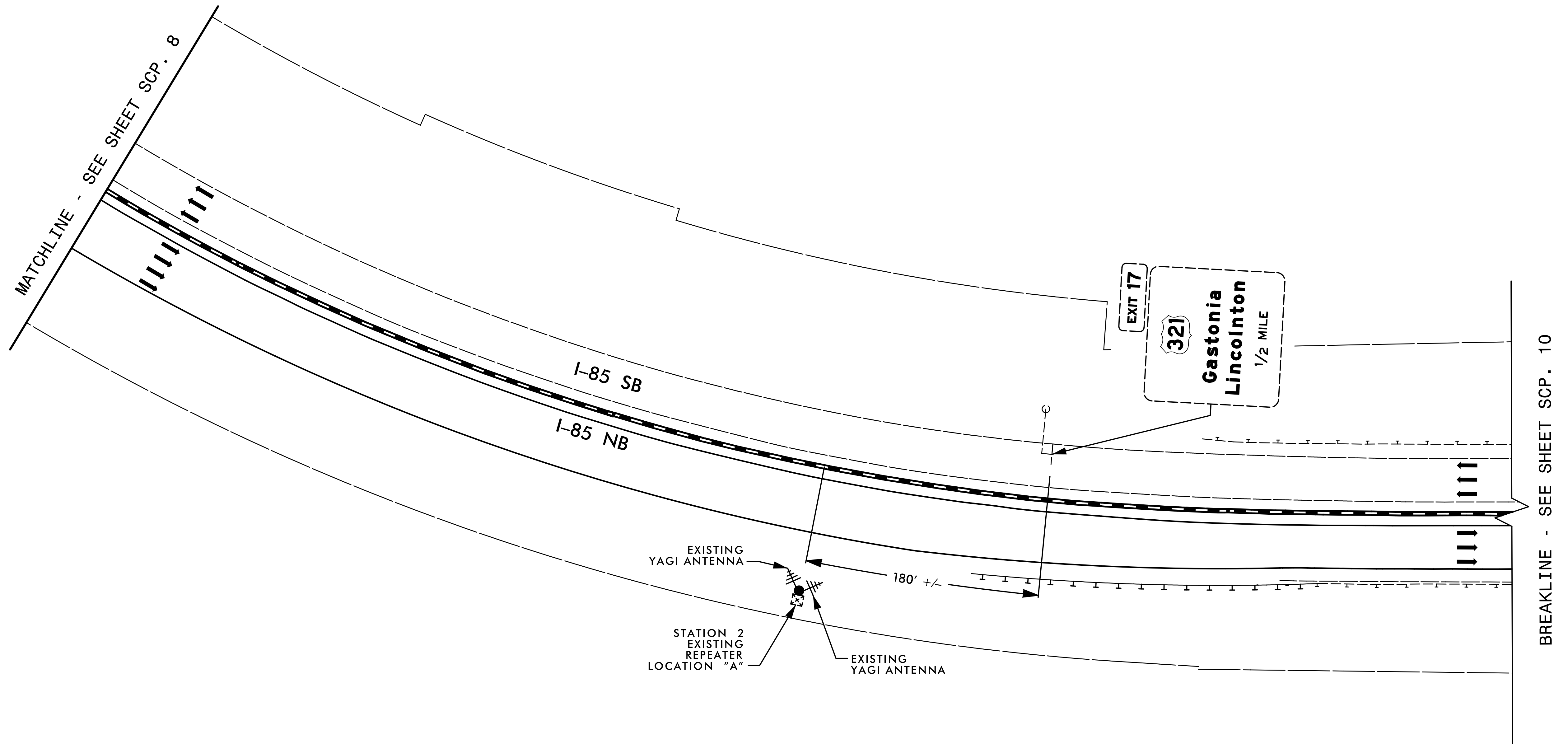
- NOTES:
1. DURING WORK ZONE TRAFFIC CONTROL TMP PHASE 1, STEP 4, WHEN EXISTING QUEUE DETECTOR LOOP IS INOPERABLE DUE TO RAMP CONSTRUCTION, TURN FLASHING BEACON SIGN (SCP.10) ON FOR CONTINUOUS OPERATION.
 2. ONCE NEW LOOP IS INSTALLED, SWITCH FLASHING BEACON SIGN BACK TO LOOP CONTROL.

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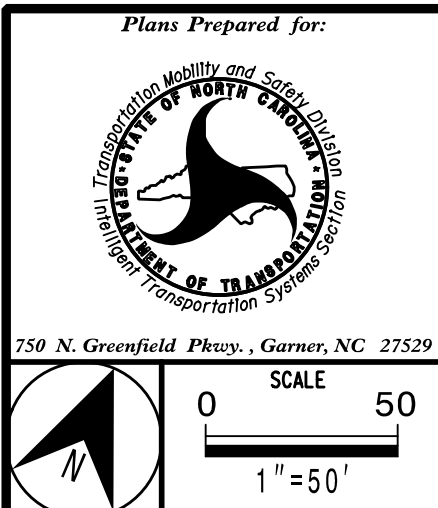
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|---|--|---|---|
| Plans Prepared for: 250 N. Greenfield Place - Garner, NC 27529 | CABLE ROUTING PLAN | | SEAL NORTH CAROLINA PROFESSIONAL ENGINEER NATASHA R. SIMMONS |
| | Division 12 Gaston Co. Gastonia PLAN DATE: September 2016 PREPARED BY: J.A. Wagner | REVIEWED BY: H.L. Winstead REVIEWED BY: N.R. Simmons | |
| SCALE 0 50 1" = 50' | REVISIONS INIT. DATE | REVISIONS INIT. DATE | CADD File name: I-5000_SCP-08.dgn |

**FOR INFORMATIONAL PURPOSES ONLY.
NO WORK REQUIRED.**

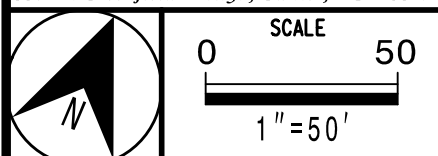
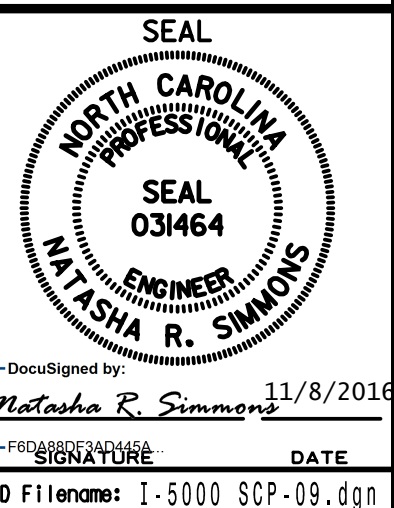


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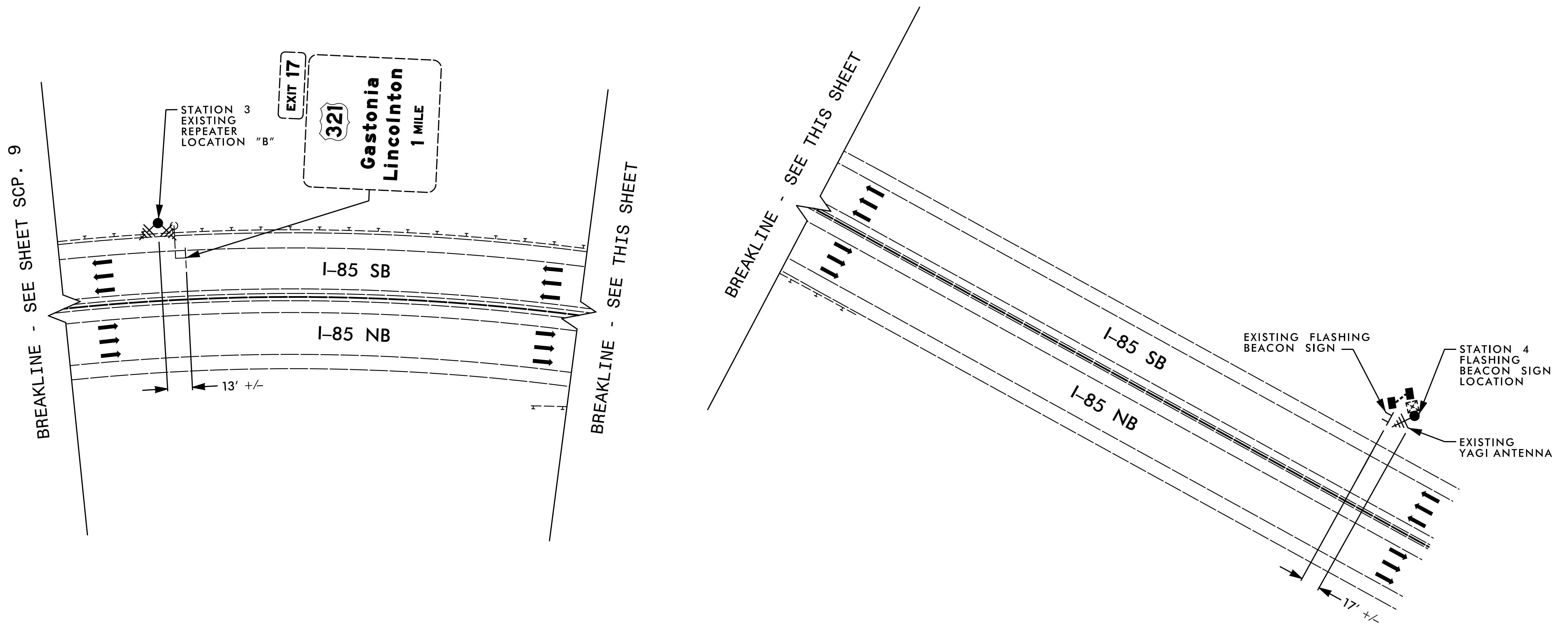
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| | |
|---------------------------|----------------------------|
| CABLE ROUTING PLAN | |
| Division 12 | Gaston Co. Gastonia |
| PLAN DATE: September 2016 | REVIEWED BY: H.L. Winstead |
| PREPARED BY: J.A. Wagner | REVIEWED BY: N.R. Simmons |
| REVISIONS | INIT. DATE |
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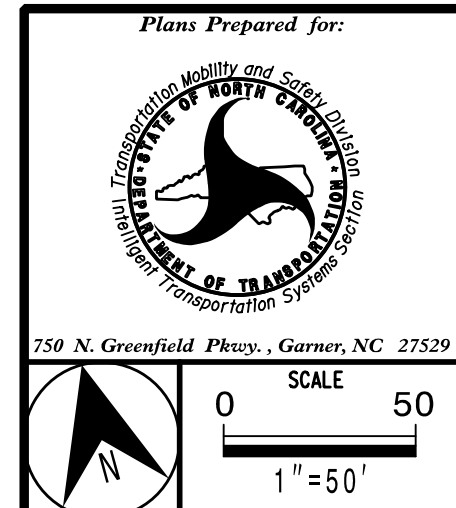


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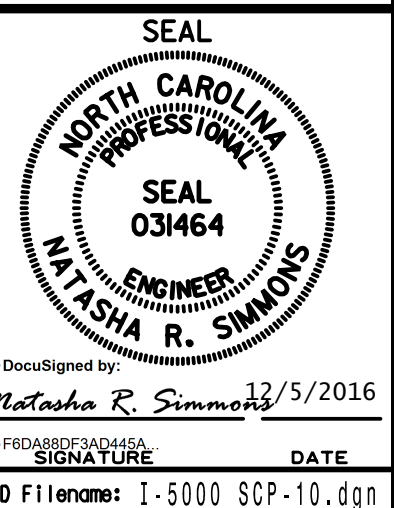
1. DURING WORK ZONE TRAFFIC CONTROL TMP PHASE 1, STEP 4, WHEN EXISTING QUEUE DETECTOR LOOP IS INOPERABLE DUE TO RAMP CONSTRUCTION, TURN FLASHING BEACON SIGN ON FOR CONTINUOUS OPERATION.
2. ONCE NEW LOOP IS INSTALLED, SWITCH FLASHING BEACON SIGN BACK TO LOOP CONTROL.

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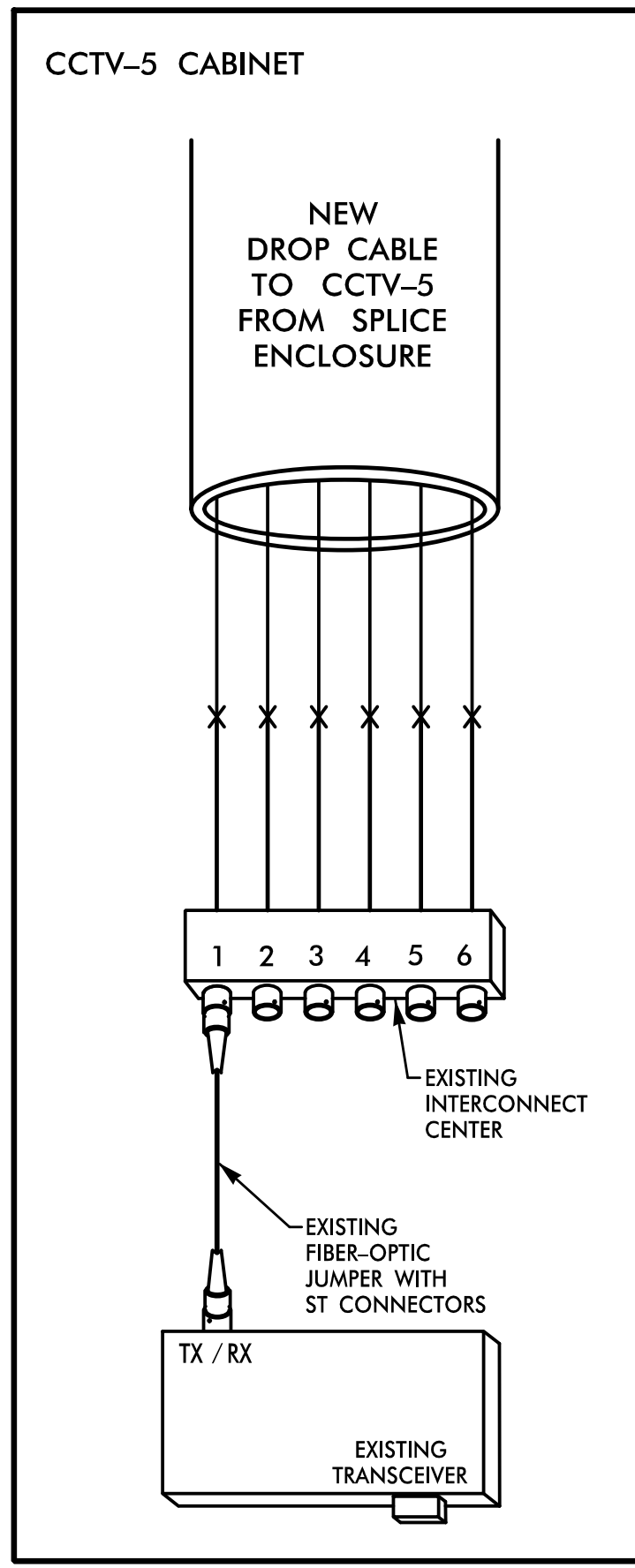
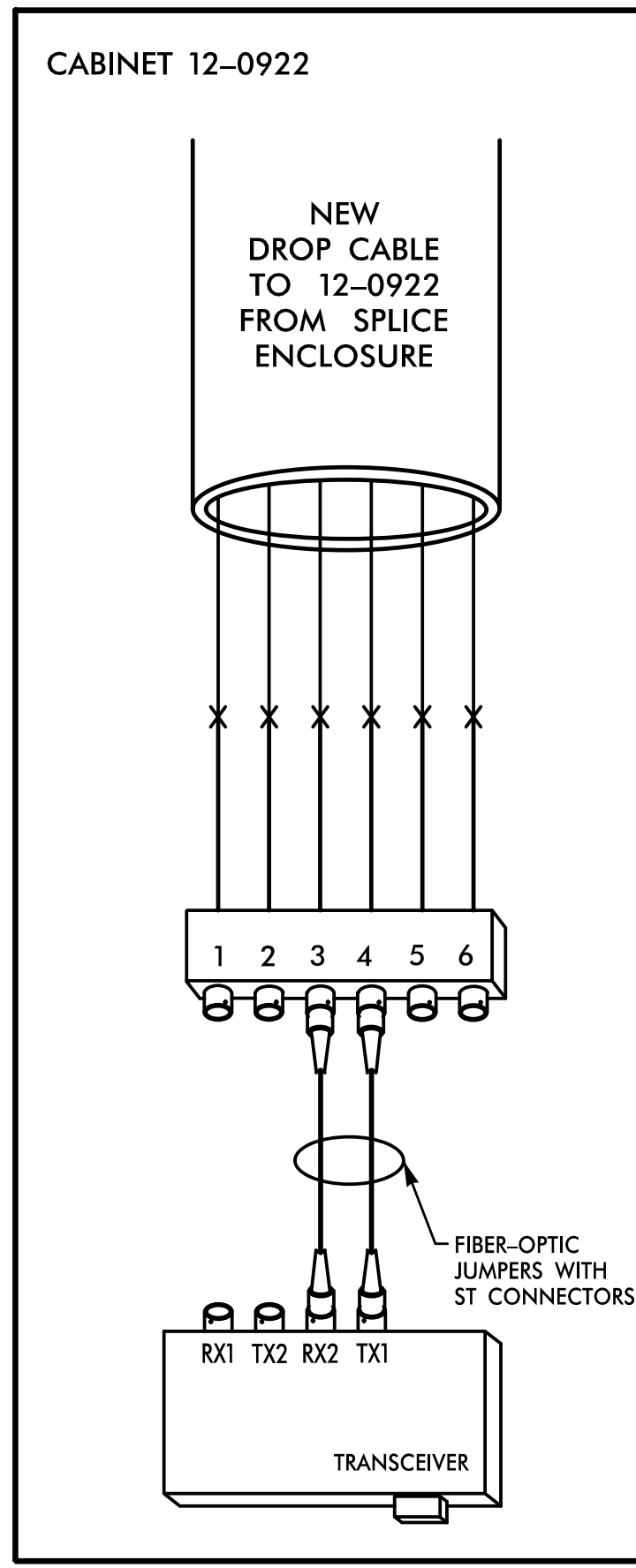
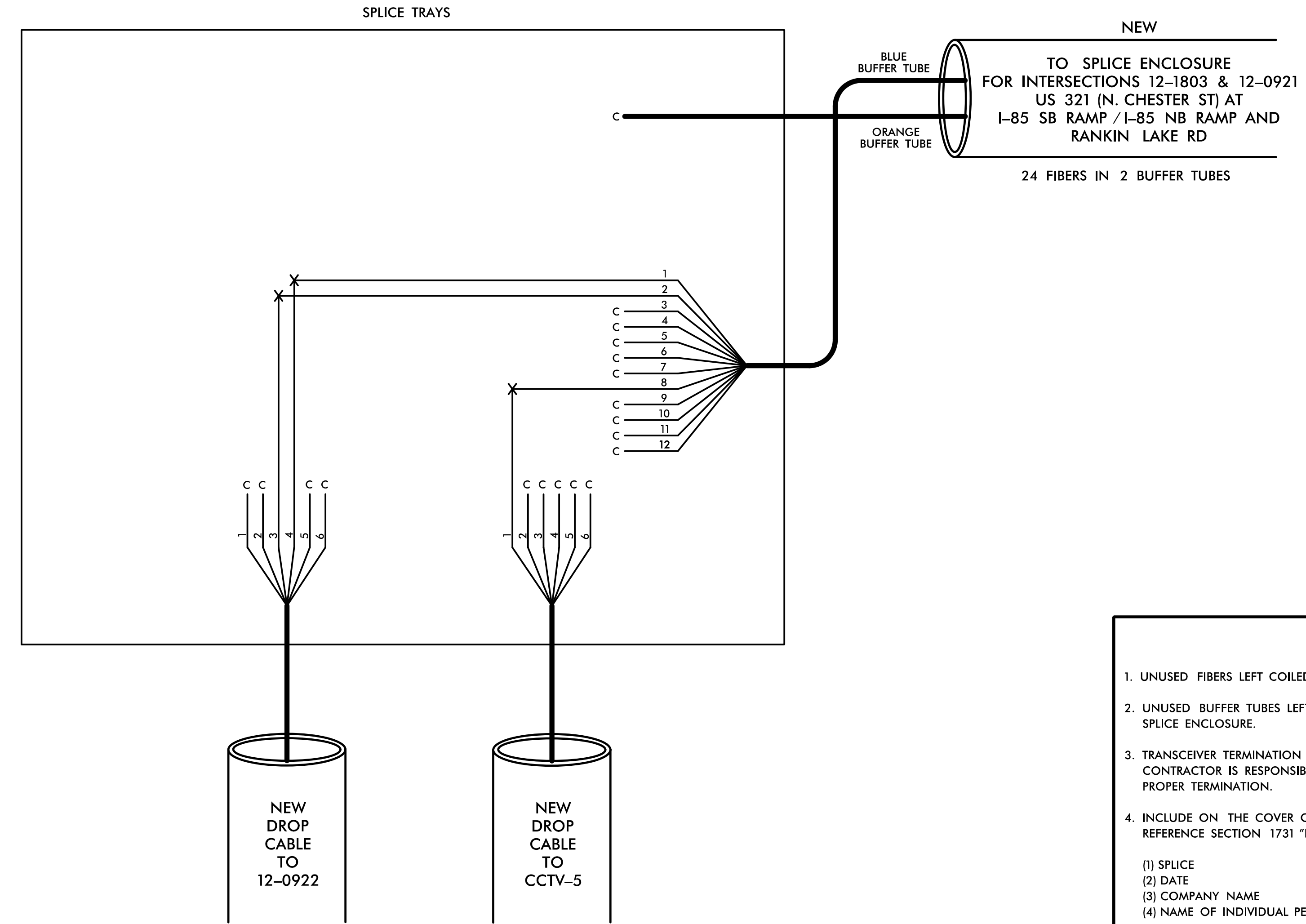
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| CABLE ROUTING PLAN | |
| Division 12 | Gaston Co. Gastonia |
| PLAN DATE: September 2016 | REVIEWED BY: H.L. Winstead |
| PREPARED BY: J.A. Wagner | REVIEWED BY: N.R. Simmons |
| REVISIONS | INIT. DATE |
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DocuSigned by:
 Natasha R. Simmons 3/5/2016
 SIGNATURE DATE
 CADD File name: I-5000 SCP-10.dgn

12-0922 & CCTV-5
 US 321 (N. CHESTER ST) AT BULB AVE / TULIP DR
 CHANNEL 11



| COLOR CODE | | LEGEND | |
|------------|-------------|---------------|--|
| T/A/E/A | 598-C | | |
| (1) BLUE | (7) RED | X = | NEW FUSION SPLICE INDIVIDUAL FIBER |
| (2) ORANGE | (8) BLACK | ● = | EXISTING FUSION SPLICE |
| (3) GREEN | (9) YELLOW | C = | CAP AND SEAL |
| (4) BROWN | (10) VIOLET | EXPRESS | = EXPRESS ENTIRE BUFFER TUBE THROUGH WITHOUT CUTTING |
| (5) SLATE | (11) ROSE | BUFFER SPLICE | = SPLICE ALL FIBERS IN BUFFER TUBE COLOR TO COLOR |
| (6) WHITE | (12) AQUA | | |



- NOTES**
- UNUSED FIBERS LEFT COILED AND STORED IN SPLICE TRAY.
 - UNUSED BUFFER TUBES LEFT COILED AND STORED IN SPLICE ENCLOSURE.
 - TRANSCIVER TERMINATION CONFIGURATIONS ARE GENERIC. CONTRACTOR IS RESPONSIBLE FOR DETERMINING / ENSURING PROPER TERMINATION.
 - INCLUDE ON THE COVER OF EACH SPLICE TRAY THE FOLLOWING: REFERENCE SECTION 1731 "FIBER OPTIC SPLICE ENCLOSURE"
- (1) SPLICE
 (2) DATE
 (3) COMPANY NAME
 (4) NAME OF INDIVIDUAL PERFORMING THE SPLICING
- PRIOR TO INSTALLING THE COVER ON THE SPLICE TRAY, TAKE A DIGITAL PHOTOGRAPH SHOWING THE SPLICE TRAY AND INFORMATION SHOWN ABOVE (1-4) AND SUBMIT PHOTOGRAPH ALONG WITH OTDR TEST RESULTS.

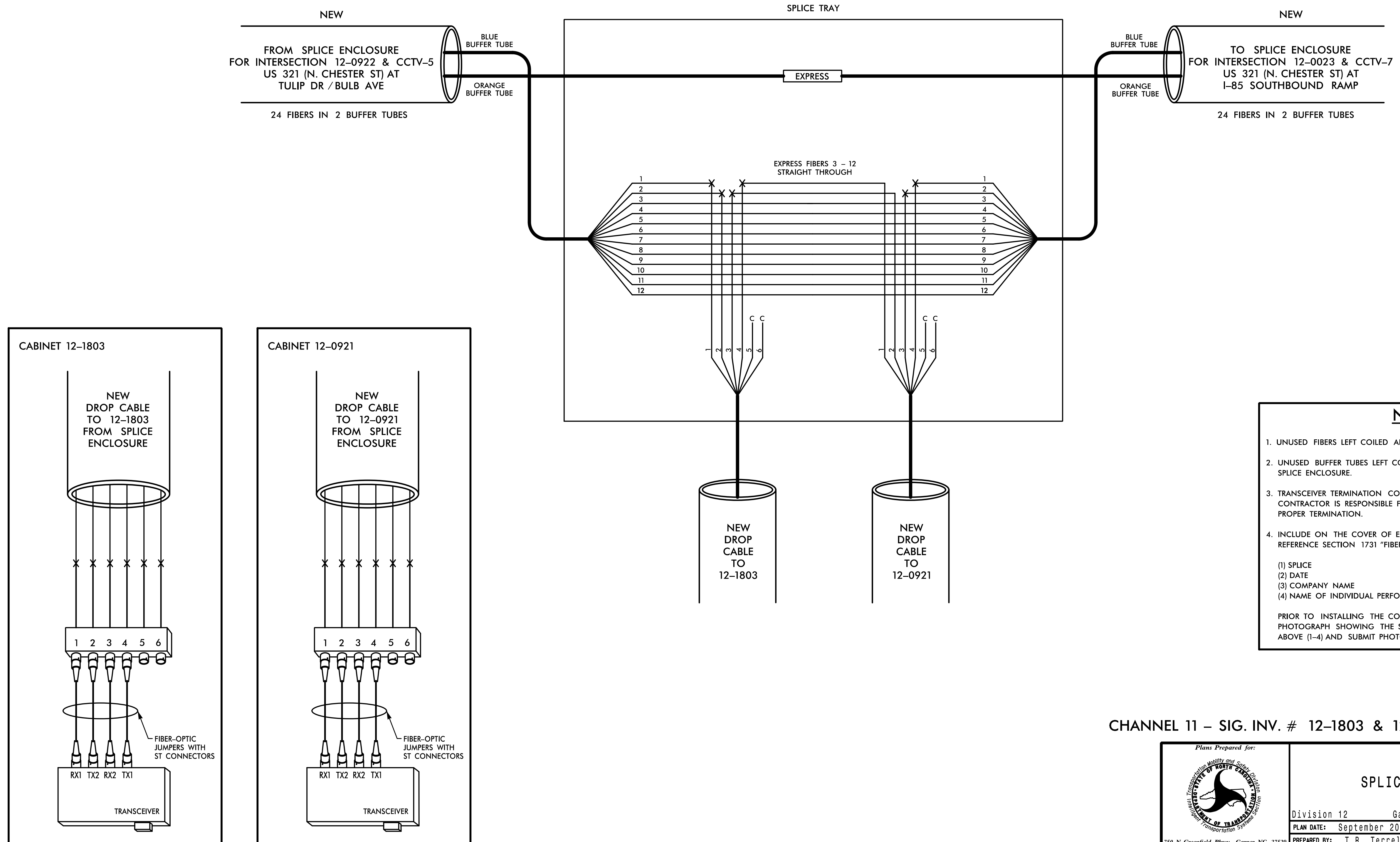
CHANNEL 11 - SIG. INV. # 12-0922 & CCTV-5 **DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED**

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| | | | |
|---|--|---|--|
| Plans Prepared for:  250 N. Greenfield Place, Garner, NC 27529 | SPLICE DETAILS | | SEAL  H.L. WINSTEAD, JR. ENGINEER 07983 |
| | Division 12 Gaston Co. Gastonia PLAN DATE: September 2016 REVIEWED BY: N.R. Simmons PREPARED BY: T.R. Terrell REVIEWED BY: H.L. Winstead | DocuSigned by: H.L. Winstead, Jr. 11/8/2016 ES3Y8281427474 SIGNATURE DATE CADD File name: I-5000 SCP-11.dgn | |

12-1803 & 12-0921
 US 321 (N. CHESTER ST) AT I-85 SB EXIT RAMP / I-85 NB ENTRANCE RAMP, AND
 US 321 (N. CHESTER ST) AT RANKIN LAKE RD
 CHANNEL 11



| COLOR CODE | | LEGEND | |
|------------|-------------|---------------|--|
| T/A/E/A | 598-C | | |
| (1) BLUE | (7) RED | X = | NEW FUSION SPLICE INDIVIDUAL FIBER |
| (2) ORANGE | (8) BLACK | • = | EXISTING FUSION SPLICE |
| (3) GREEN | (9) YELLOW | C = | CAP AND SEAL |
| (4) BROWN | (10) VIOLET | EXPRESS | EXPRESS ENTIRE BUFFER TUBE THROUGH WITHOUT CUTTING |
| (5) SLATE | (11) ROSE | BUFFER SPLICE | SPLICE ALL FIBERS IN BUFFER TUBE COLOR TO COLOR |
| (6) WHITE | (12) AQUA | | |



- NOTES**
- UNUSED FIBERS LEFT COILED AND STORED IN SPLICE TRAY.
 - UNUSED BUFFER TUBES LEFT COILED AND STORED IN SPLICE ENCLOSURE.
 - TRANSCIVER TERMINATION CONFIGURATIONS ARE GENERIC. CONTRACTOR IS RESPONSIBLE FOR DETERMINING / ENSURING PROPER TERMINATION.
 - INCLUDE ON THE COVER OF EACH SPLICE TRAY THE FOLLOWING: REFERENCE SECTION 1731 "FIBER OPTIC SPLICE ENCLOSURE"
- (1) SPLICE
 (2) DATE
 (3) COMPANY NAME
 (4) NAME OF INDIVIDUAL PERFORMING THE SPLICING
- PRIOR TO INSTALLING THE COVER ON THE SPLICE TRAY, TAKE A DIGITAL PHOTOGRAPH SHOWING THE SPLICE TRAY AND INFORMATION SHOWN ABOVE (1-4) AND SUBMIT PHOTOGRAPH ALONG WITH OTDR TEST RESULTS.

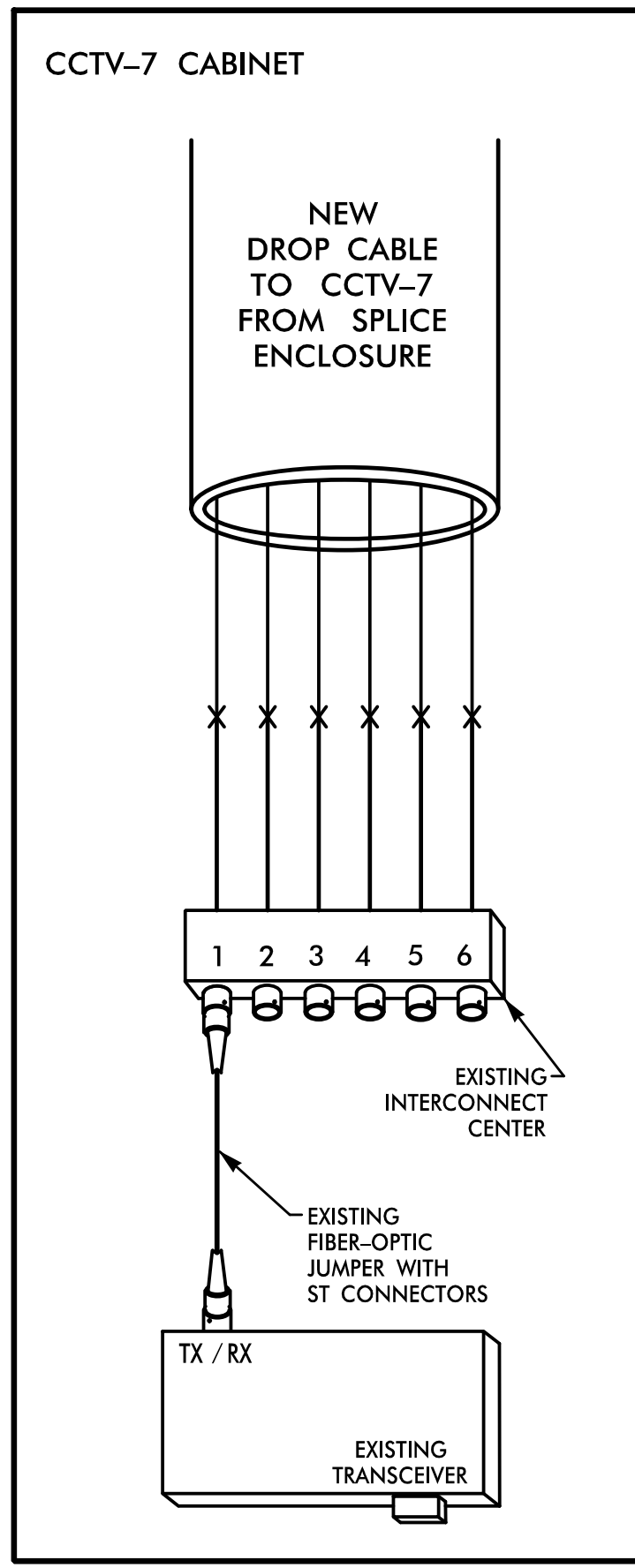
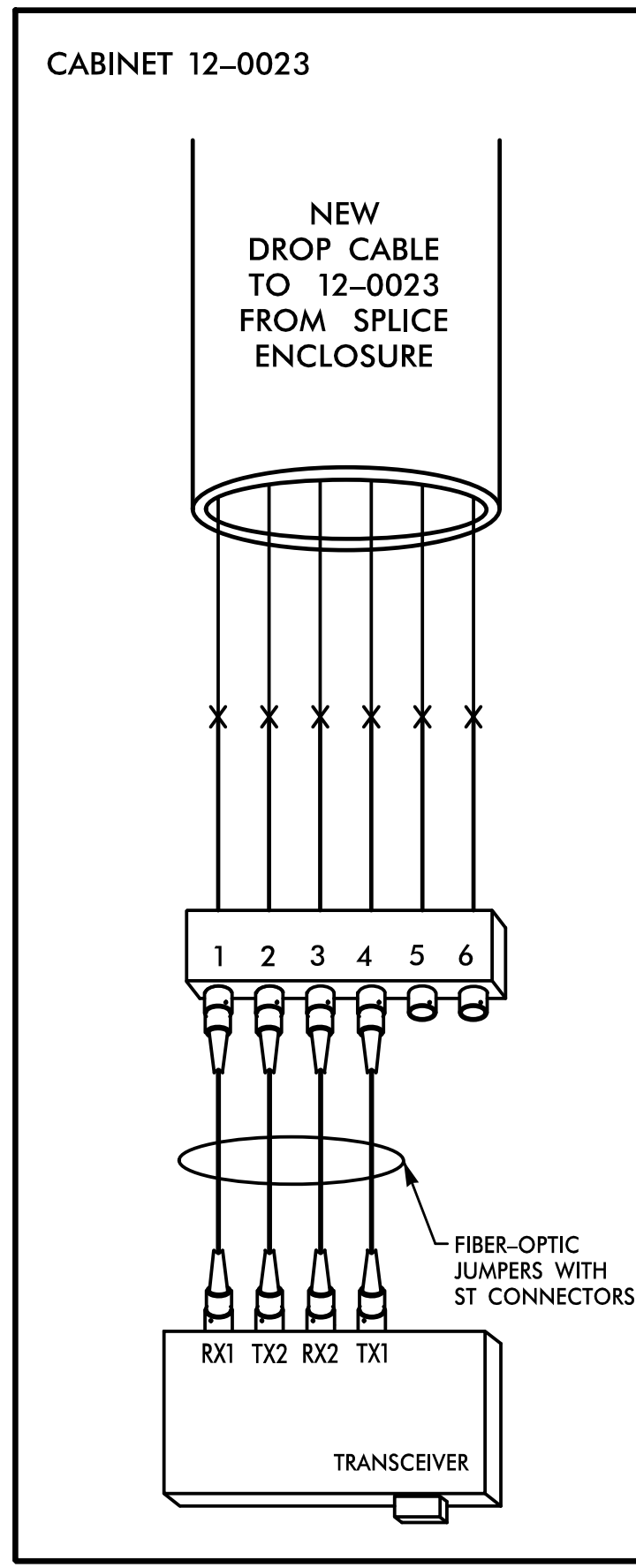
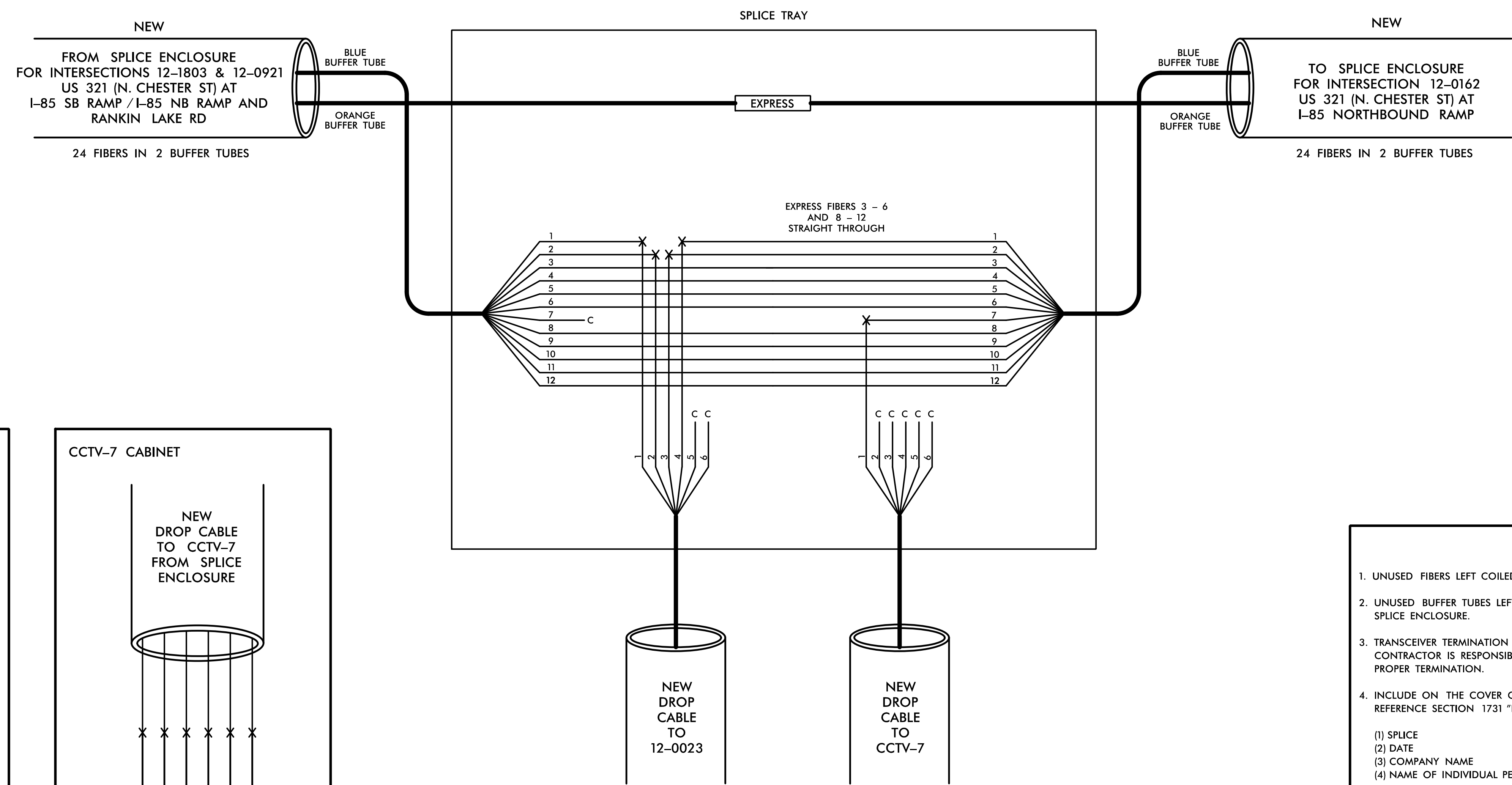
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| | | | |
|---|--|-------------------------|--|
| Plans Prepared for:  250 N. Greenfield Place, Garner, NC 27529 | SPLICE DETAILS | | SEAL  H.L. Winstead, Jr. 11/8/2016 |
| | Division 12 Gaston Co. Gastonia PLAN DATE: September 2016 REVIEWED BY: N.R. Simmons PREPARED BY: T.R. Terrell REVIEWED BY: H.L. Winstead | REVISIONS INIT. DATE | |

12-0023 & CCTV-7
 US 321 (N. CHESTER ST) AT I-85 SOUTHBOUND RAMP
 CHANNEL 11

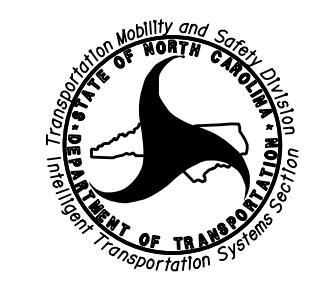

| COLOR CODE | | LEGEND | |
|------------|-------------|---------------|--|
| T/A/E/A | 598-C | | |
| (1) BLUE | (7) RED | X = | NEW FUSION SPLICE INDIVIDUAL FIBER |
| (2) ORANGE | (8) BLACK | ● = | EXISTING FUSION SPLICE |
| (3) GREEN | (9) YELLOW | C = | CAP AND SEAL |
| (4) BROWN | (10) VIOLET | EXPRESS | EXPRESS ENTIRE BUFFER TUBE THROUGH WITHOUT CUTTING |
| (5) SLATE | (11) ROSE | BUFFER SPLICE | SPLICE ALL FIBERS IN BUFFER TUBE COLOR TO COLOR |
| (6) WHITE | (12) AQUA | | |



- NOTES**
- UNUSED FIBERS LEFT COILED AND STORED IN SPLICE TRAY.
 - UNUSED BUFFER TUBES LEFT COILED AND STORED IN SPLICE ENCLOSURE.
 - TRANSCIVER TERMINATION CONFIGURATIONS ARE GENERIC. CONTRACTOR IS RESPONSIBLE FOR DETERMINING / ENSURING PROPER TERMINATION.
 - INCLUDE ON THE COVER OF EACH SPLICE TRAY THE FOLLOWING: REFERENCE SECTION 1731 "FIBER OPTIC SPLICE ENCLOSURE"
- (1) SPLICE
 (2) DATE
 (3) COMPANY NAME
 (4) NAME OF INDIVIDUAL PERFORMING THE SPLICING
- PRIOR TO INSTALLING THE COVER ON THE SPLICE TRAY, TAKE A DIGITAL PHOTOGRAPH SHOWING THE SPLICE TRAY AND INFORMATION SHOWN ABOVE (1-4) AND SUBMIT PHOTOGRAPH ALONG WITH OTDR TEST RESULTS.

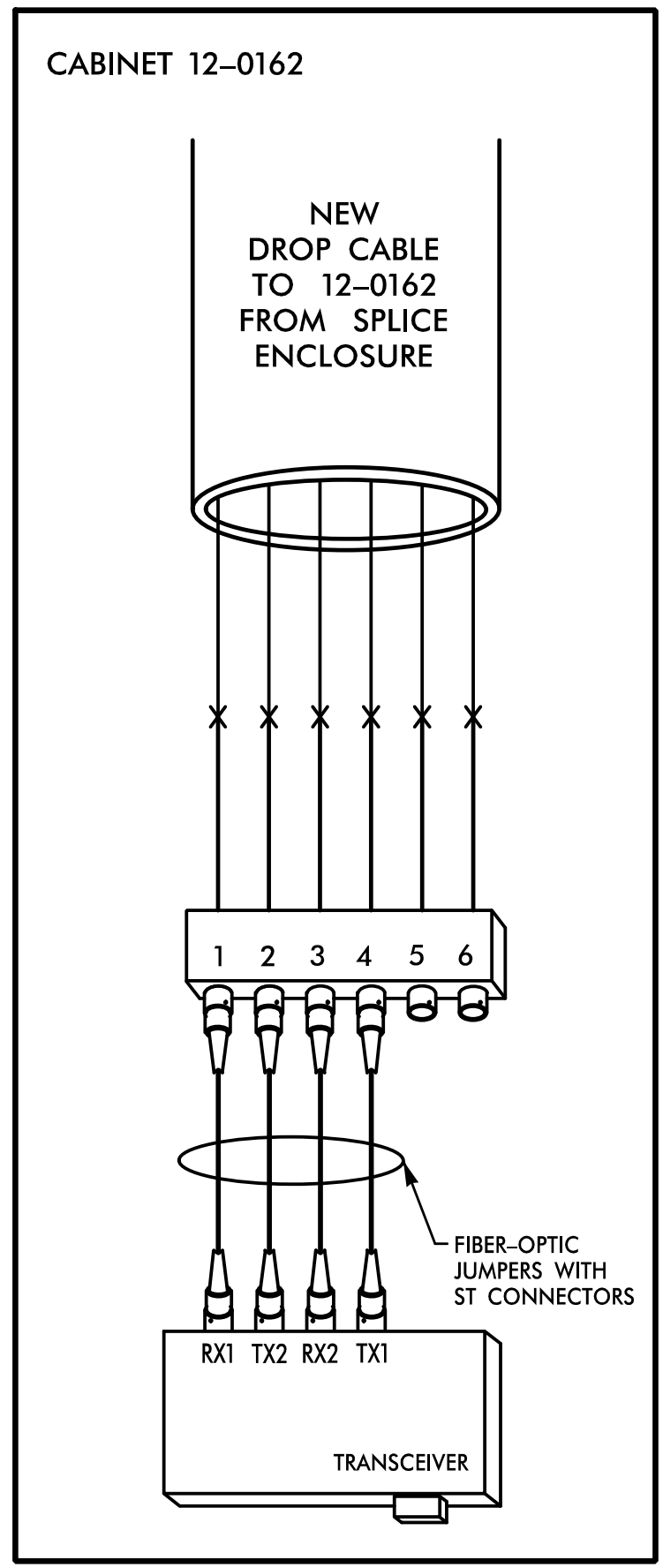
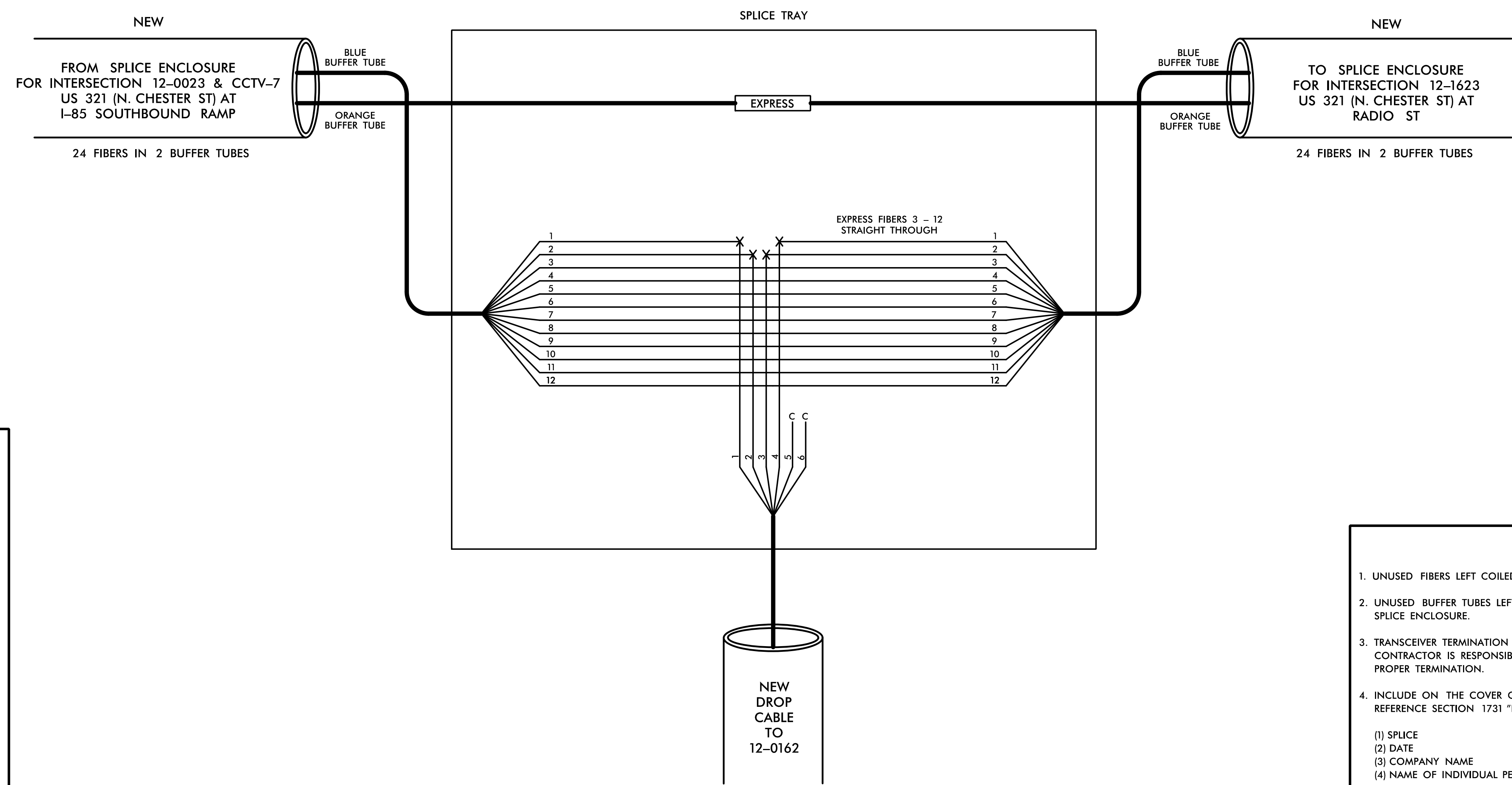
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| | | | |
|---|--|-------------------------|--|
| Plans Prepared for:  250 N. Greenfield Place, Garner, NC 27529 | SPLICE DETAILS | | SEAL  H.L. WINSTEAD, JR. ENGINEER 11/8/2016 |
| | Division 12 Gaston Co. Gastonia PLAN DATE: September 2016 REVIEWED BY: N.R. Simmons PREPARED BY: T.R. Terrell REVIEWED BY: H.L. Winstead | REVISIONS INIT. DATE | |
| SCALE NONE | DocuSigned by: H.L. Winstead, Jr. 11/8/2016 ES118281427674 SIGNATURE DATE CADD File name: I-5000 SCP-13.dgn | | |

12-0162
 US 321 (N. CHESTER ST) AT I-85 NORTHBOUND RAMP
 CHANNEL 11

| COLOR CODE | | LEGEND | |
|------------|-------------|---------------|--|
| T/A/E/A | 598-C | | |
| (1) BLUE | (7) RED | X = | NEW FUSION SPLICE INDIVIDUAL FIBER |
| (2) ORANGE | (8) BLACK | ● = | EXISTING FUSION SPLICE |
| (3) GREEN | (9) YELLOW | C = | CAP AND SEAL |
| (4) BROWN | (10) VIOLET | EXPRESS | EXPRESS ENTIRE BUFFER TUBE THROUGH WITHOUT CUTTING |
| (5) SLATE | (11) ROSE | BUFFER SPLICE | SPLICE ALL FIBERS IN BUFFER TUBE COLOR TO COLOR |
| (6) WHITE | (12) AQUA | | |



- NOTES**
- UNUSED FIBERS LEFT COILED AND STORED IN SPLICE TRAY.
 - UNUSED BUFFER TUBES LEFT COILED AND STORED IN SPLICE ENCLOSURE.
 - TRANSCIEVER TERMINATION CONFIGURATIONS ARE GENERIC. CONTRACTOR IS RESPONSIBLE FOR DETERMINING /ENSURING PROPER TERMINATION.
 - INCLUDE ON THE COVER OF EACH SPLICE TRAY THE FOLLOWING: REFERENCE SECTION 1731 "FIBER OPTIC SPLICE ENCLOSURE"
- (1) SPLICE
 (2) DATE
 (3) COMPANY NAME
 (4) NAME OF INDIVIDUAL PERFORMING THE SPLICING
- PRIOR TO INSTALLING THE COVER ON THE SPLICE TRAY, TAKE A DIGITAL PHOTOGRAPH SHOWING THE SPLICE TRAY AND INFORMATION SHOWN ABOVE (1-4) AND SUBMIT PHOTOGRAPH ALONG WITH OTDR TEST RESULTS.

CHANNEL 11 – SIG. INV. # 12-0162

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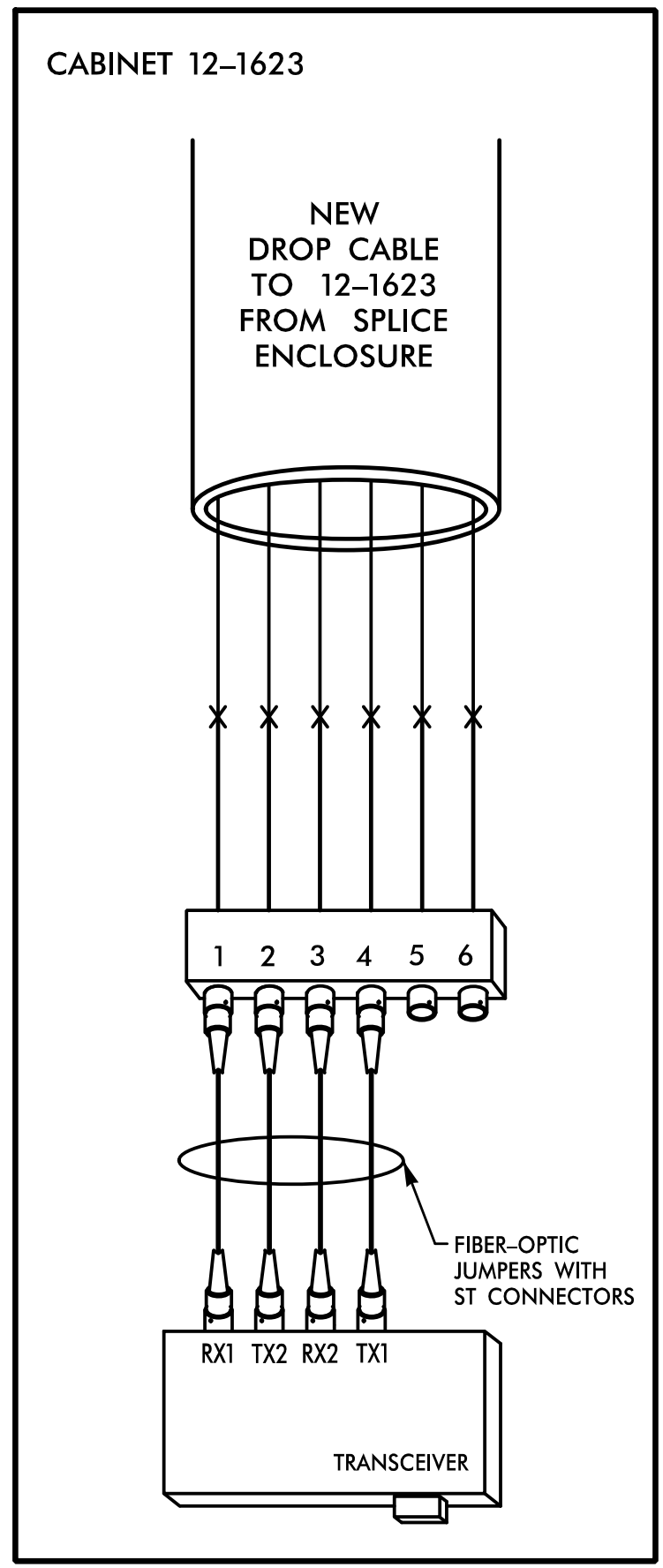
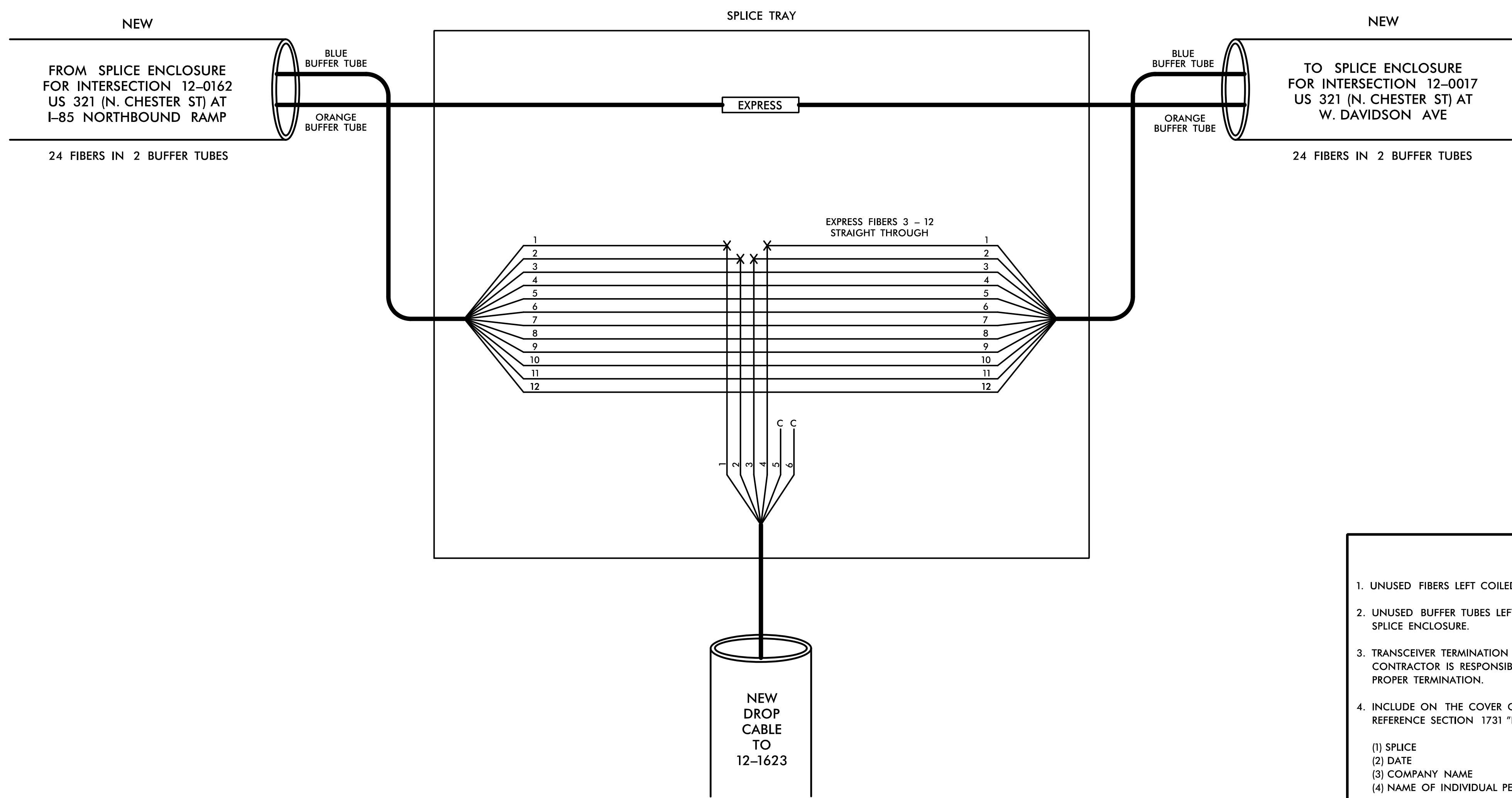
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 Raleigh, North Carolina 27609
 NC License No: C-1554
 (919) 546-8997

| | | | |
|--|--|---------------|---|
| Plans Prepared for: 250 N. Greenfield Place, Garner, NC 27529 | SPLICE DETAILS | | SEAL H.L. Winstead, Jr. 11/8/2016 |
| | Division 12 Gaston Co. Gastonia PLAN DATE: September 2016 REVIEWED BY: N.R. Simmons PREPARED BY: T.R. Terrell REVIEWED BY: H.L. Winstead | SCALE NONE | |

CADD File name: I-5000 SCP-14.dgn

12-1623
US 321 (N. CHESTER ST) AT RADIO ST
CHANNEL 11

| COLOR CODE | | LEGEND | |
|------------|-------------|---------------|--|
| T/A/E/A | 598-C | | |
| (1) BLUE | (7) RED | X = | NEW FUSION SPLICE INDIVIDUAL FIBER |
| (2) ORANGE | (8) BLACK | ● = | EXISTING FUSION SPLICE |
| (3) GREEN | (9) YELLOW | C = | CAP AND SEAL |
| (4) BROWN | (10) VIOLET | EXPRESS | EXPRESS ENTIRE BUFFER TUBE THROUGH WITHOUT CUTTING |
| (5) SLATE | (11) ROSE | BUFFER SPLICE | SPLICE ALL FIBERS IN BUFFER TUBE COLOR TO COLOR |
| (6) WHITE | (12) AQUA | | |

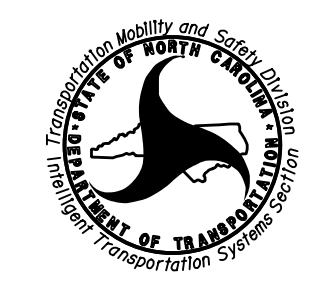



- NOTES**
- UNUSED FIBERS LEFT COILED AND STORED IN SPLICE TRAY.
 - UNUSED BUFFER TUBES LEFT COILED AND STORED IN SPLICE ENCLOSURE.
 - TRANSCEIVER TERMINATION CONFIGURATIONS ARE GENERIC. CONTRACTOR IS RESPONSIBLE FOR DETERMINING / ENSURING PROPER TERMINATION.
 - INCLUDE ON THE COVER OF EACH SPLICE TRAY THE FOLLOWING: REFERENCE SECTION 1731 "FIBER OPTIC SPLICE ENCLOSURE"
- (1) SPLICE
(2) DATE
(3) COMPANY NAME
(4) NAME OF INDIVIDUAL PERFORMING THE SPLICING
- PRIOR TO INSTALLING THE COVER ON THE SPLICE TRAY, TAKE A DIGITAL PHOTOGRAPH SHOWING THE SPLICE TRAY AND INFORMATION SHOWN ABOVE (1-4) AND SUBMIT PHOTOGRAPH ALONG WITH OTDR TEST RESULTS.

CHANNEL 11 - SIG. INV. # 12-1623

DOCUMENT NOT CONSIDERED FINAL
UNLESS ALL SIGNATURES COMPLETED

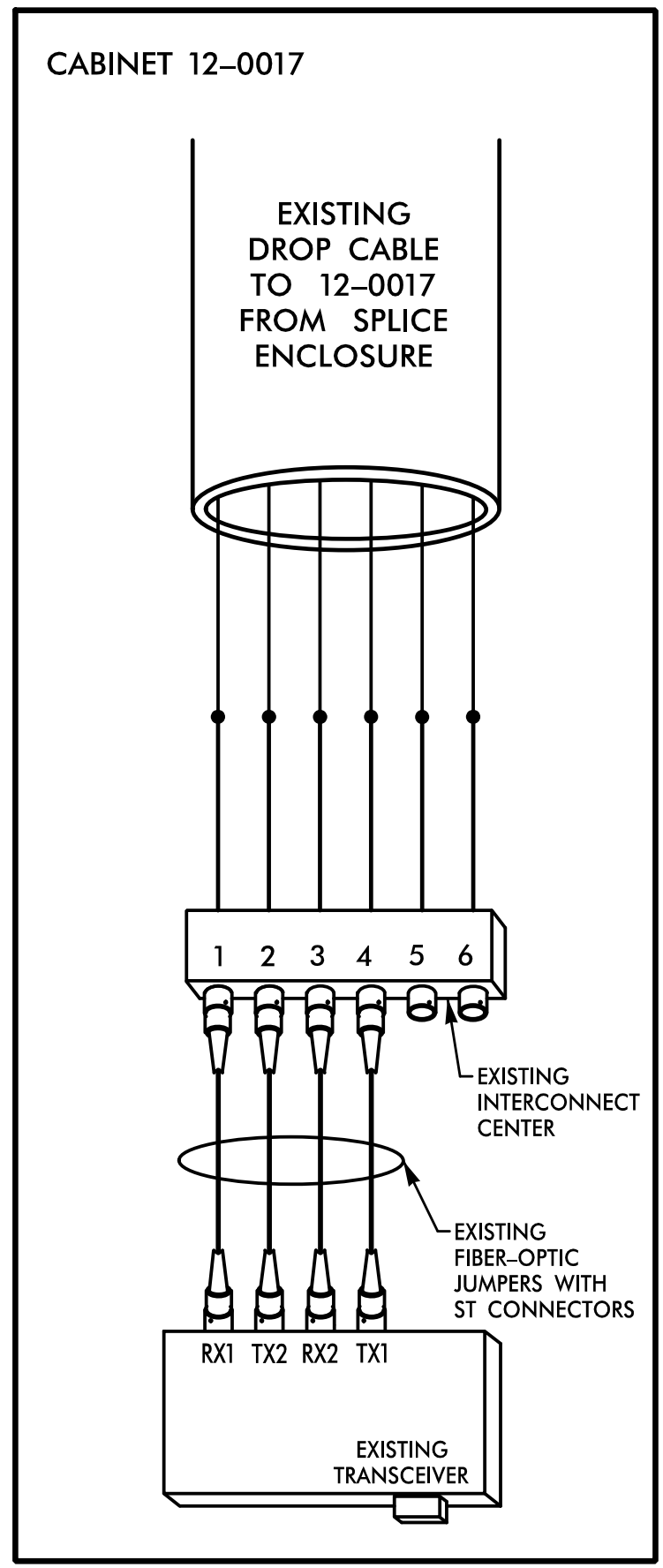
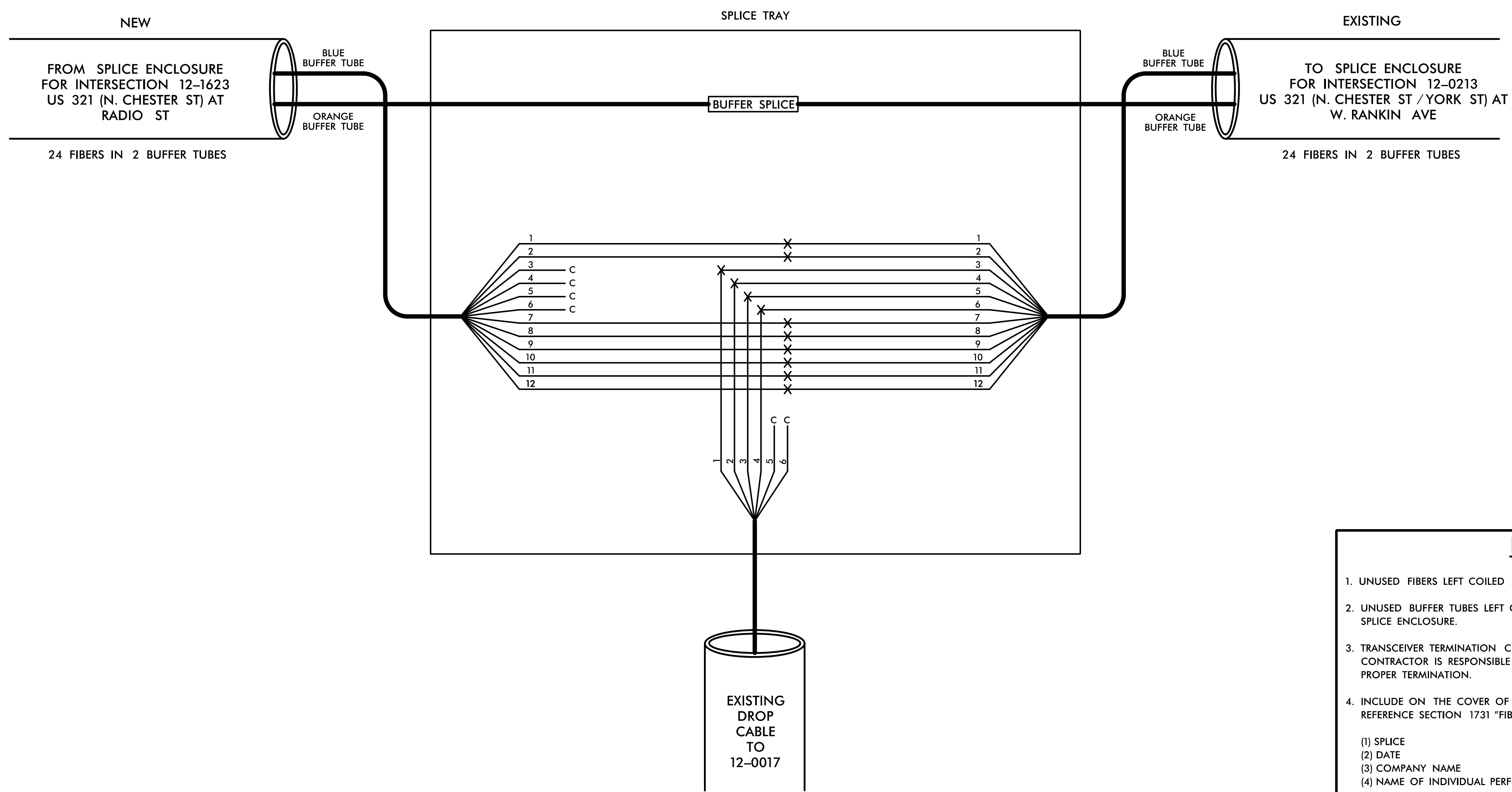
HNTB HNTB NORTH CAROLINA, P.C.
343 E. Six Forks Road, Suite 200
Raleigh, North Carolina 27609
NC License No: C-1554
(919) 546-8997

| | | | |
|---|--|---------------|--|
| Plans Prepared for:  250 N. Greenfield Place, Garner, NC 27529 | SPLICE DETAILS | | SEAL  H.L. Winstead, Jr. 11/8/2016 |
| | Division 12 Gaston Co. Gastonia PLAN DATE: September 2016 REVIEWED BY: N.R. Simmons PREPARED BY: T.R. Terrell REVIEWED BY: H.L. Winstead | SCALE NONE | |

CADD File name: I-5000 SCP-15.dgn

12-0017
 US 321 (N. CHESTER ST) AT W. DAVIDSON AVE
 CHANNEL 10

| COLOR CODE | | LEGEND | |
|------------|-------------|---------------|--|
| TIA/EIA | 598-C | | |
| (1) BLUE | (7) RED | X = | NEW FUSION SPLICE INDIVIDUAL FIBER |
| (2) ORANGE | (8) BLACK | ● = | EXISTING FUSION SPLICE |
| (3) GREEN | (9) YELLOW | C = | CAP AND SEAL |
| (4) BROWN | (10) VIOLET | EXPRESS | EXPRESS ENTIRE BUFFER TUBE THROUGH WITHOUT CUTTING |
| (5) SLATE | (11) ROSE | BUFFER SPLICE | SPLICE ALL FIBERS IN BUFFER TUBE COLOR TO COLOR |
| (6) WHITE | (12) AQUA | | |

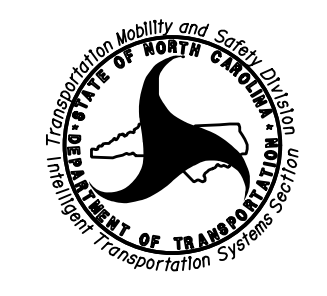



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 (4) NAME OF INDIVIDUAL PERFORMING THE SPLICING
- PRIOR TO INSTALLING THE COVER ON THE SPLICE TRAY, TAKE A DIGITAL PHOTOGRAPH SHOWING THE SPLICE TRAY AND INFORMATION SHOWN ABOVE (1-4) AND SUBMIT PHOTOGRAPH ALONG WITH OTDR TEST RESULTS.

CHANNEL 10 - SIG. INV. # 12-0017

DOCUMENT NOT CONSIDERED FINAL
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 343 E. Six Forks Road, Suite 200
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| | | | |
|---|--|---------------|---|
| Plans Prepared for:  250 N. Greenfield Place, Garner, NC 27529 | SPLICE DETAILS | | SEAL  H.L. Winstead, Jr. ENGINEER |
| | Division 12 Gaston Co. Gastonia PLAN DATE: September 2016 REVIEWED BY: N.R. Simmons PREPARED BY: T.R. Terrell REVIEWED BY: H.L. Winstead | SCALE NONE | |
| Documented by: H.L. Winstead, Jr. 11/8/2016 SIGNATURE DATE CADD File name: I-5000 SCP-16.dgn | | | |